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DIESEL PROGRESS

SEPTEMBER, 1942

ALL 6 REPORT

No Stuck Rings

'10 YEARS

without a single stuck ring . . . 4 Diesels.

'LESS WEAR,

less carbon, no stuck rings" . . . 2 Diesels.

'15-YEAR

freedom from carbon and sticking ring troubles.

'1000 HRS.

additional service between piston inspections . . . 6 Diesels.

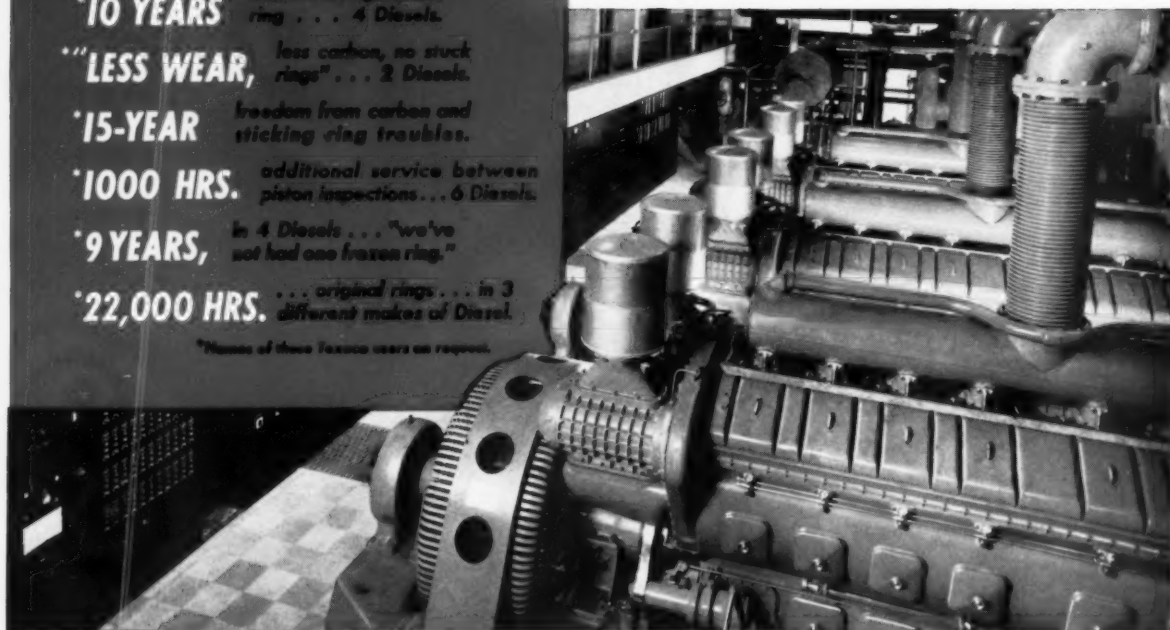
'9 YEARS,

in 4 Diesels . . . "we've not had one frozen ring."

'22,000 HRS.

. . . original rings . . . in 3 different makes of Diesel.

*Names of these Texaco users on request.



THREE 1050-hp. GENERAL MOTORS DIESELS in modern Miami office building. Freedom from stuck rings and very low oil consumption are attributed to the exclusive use of *Texaco Ursa Oil*.

In your Diesels, too, rings will stay free . . . assuring fuel-saving compression and sustained, full-power output . . . when you use *Texaco Algol* or *Ursa Oils*.

Highly resistant to the formation of gum, sludge and carbon, these Texaco oils keep rings, ring grooves, valves and ports CLEAN. They reduce bearing and liner wear.

Because of the benefits Texaco brings—

More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

The outstanding performance that has made Texaco FIRST in the stationary Diesel field, has made it FIRST in the fields listed in the panel.

These Texaco users enjoy many benefits that can also be yours. A Texaco Lubrication Engineer will gladly co-operate . . . just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write to The Texas Company, 135 East 42nd Street, New York, N. Y.

Care for your Car
...for your Country

THEY PREFER TEXACO

- ★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.
- ★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.
- ★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.
- ★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.
- ★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.



Tune in the TEXACO STAR THEATRE every Sunday night—CBS

HELP WIN THE WAR BY RETURNING
EMPTY DRUMS PROMPTLY



TEXACO Lubricants and Fuels

FOR ALL DIESEL ENGINES



DIESEL GAS ENGINE PROGRESS

REX W. WADMAN
Editor and Publisher

FRONT COVER ILLUSTRATION: Caterpillar tractor and Le Tourneau Carryall scraper repairing a break in the High-line Canal which furnishes water for irrigating the north end of Imperial Valley.

TABLE OF CONTENTS ILLUSTRATION: A two-unit, 2,000 bhp. locomotive built by American Locomotive Company and powered with two Alco railway type, turbocharged (Buchi System) Diesels in freight transfer service.

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HEYWORTH CAMPBELL
Art Director

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IT remains to but a very few of us to earn the honor of having a fine, seagoing ship named after us. Monuments are frequently erected to big men after they have passed along, seldom does a man earn the right to visualize actually his own monument, but here is a case where it can happen and has happened—to A. C. Dodge, Vice-President of Fairbanks, Morse & Company. There is a 220-ft. coastwise tanker working day and night, Sundays and holidays, hauling vitally needed fuel along some part of our long coast line right now—and that tanker proudly carries the name of *A. C. Dodge*. A big, husky, seagoing ship named after a big, rugged, hard-working, highly successful salesman who has well earned the title of Vice-President in Charge of Sales and who has and still can go out and close a sale, if that be necessary, and sometimes it is, as some of the F-M branch managers have found out to their chagrin.

A. C. Dodge, Vice President in Charge of Sales, Fairbanks, Morse & Company.

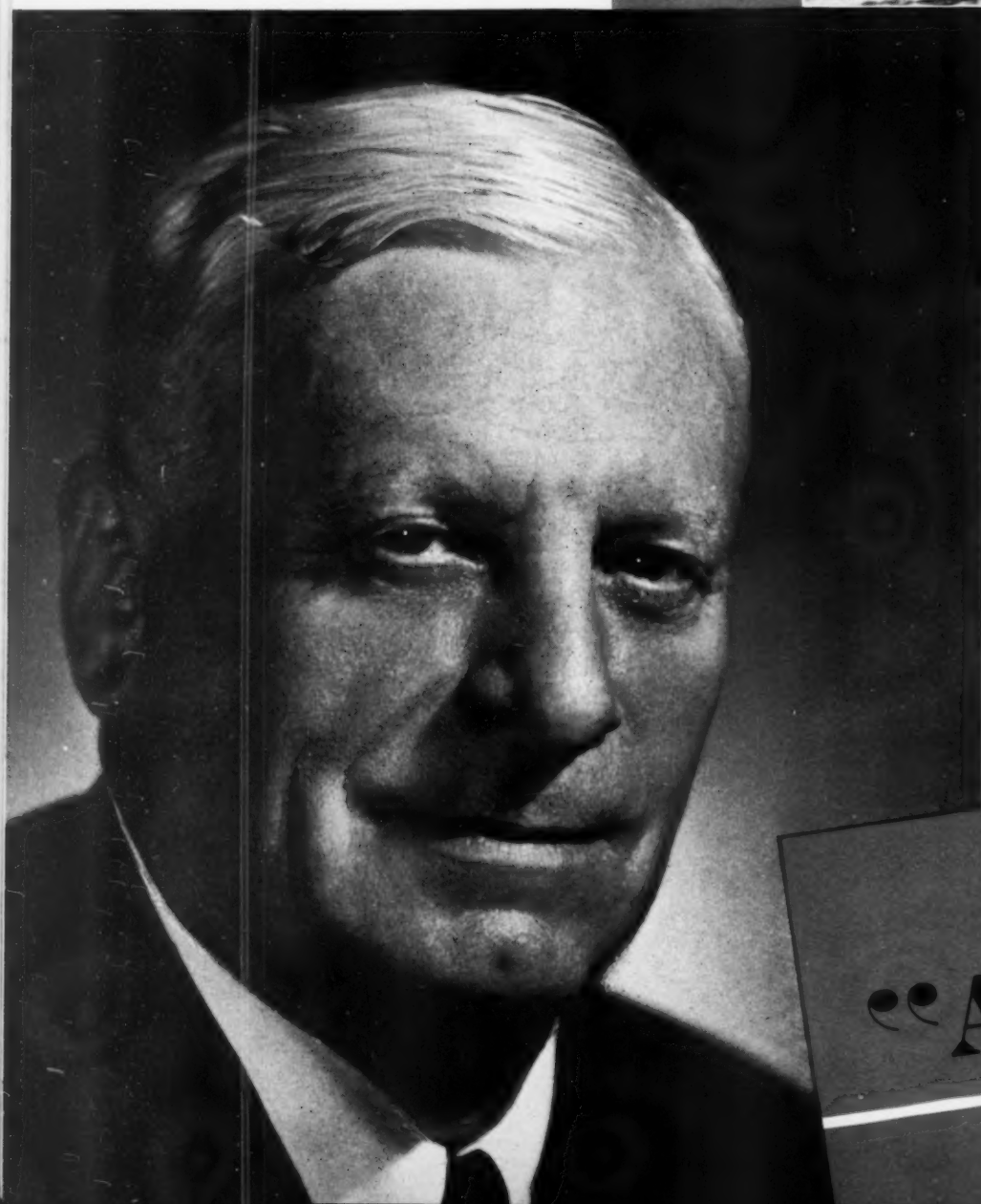


NEW DIESEL ANI

He is quite a character, this fellow Dodge. He might well have been named Horatio Alger; he has come up the hard way and nobody helped him but himself. Not an unusual story in these United States, where a man can still be the architect of his own career, of his own life, but it makes good reading, this life-to-date story of Vice-President Dodge, so I'm going to

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THE
"A. C. DODGE"

By REX W. WAD



The new Diesel tanker "A. C. Dodge" silhouetted against a familiar skyline.

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tell you about him before I talk about the fine ship which has been named after him.

Back in April 7, 1880, in Cleveland, Ohio, the name of A. C. Dodge was found in the birth announcements that day. His family drifted around a little, even as yours and mine. He finished high school in Lansing, Michigan, and

graduated from Michigan State in 1904. Like most youngsters out of college, he kicked around quite a lot, spending three years down in Peru for the Cerro de Pasco Mining Company. Back in the good old U.S.A. he went to work, quite accidentally, at the time, for Fairbanks, Morse & Company in its Cleveland, Ohio, branch—right back from where he started, so to speak. His first job with the company carried the high sounding title of Sales Promotion Manager but not much pay. But Dodge did a good job of sales promoting, not only for the company but for himself, because, when the Cleveland branch manager was transferred to New York, he took our embryonic vice-president with him—and then the young man really started hitting his stride. In 1910, he became a salesman out of the New York branch in the railroad division and promptly showed that a big man with a big voice could be heard in a railroad shop—he got orders. In 1912, the Company "upped" him by sending

him to Cincinnati as Assistant Manager and it just took this fellow Dodge four years to become manager of that important branch. In 1921, having exhausted the possibilities of the Cincinnati territory, he moved to the St. Paul branch as manager. He sold and helped sell a lot of Diesels in the St. Paul territory from 1921 through 1924, and when I say "a lot," I mean just that. In 1924, the biggest of all management plums in the F-M organization was handed to A. C. Dodge—the job of running the New York office and here he stayed until 1931 when Colonel Morse and the Board of Directors called him to Chicago as General Sales Manager. In 1935, they made him a Vice-President and now he is both Vice-President in Charge of Sales and a member of the Board of Directors of the Company. Grey haired, yes. Big, yes. Pleasingly plump as befits a man who has worked hard, lived hard—but in fine physical shape. A hard hitting, hard driving Sales Manager who has made an outstanding success



Top view: After section of the pilot house, showing Weston tachometer, direction finder, and radio telephone. Above, view in officers' quarters.

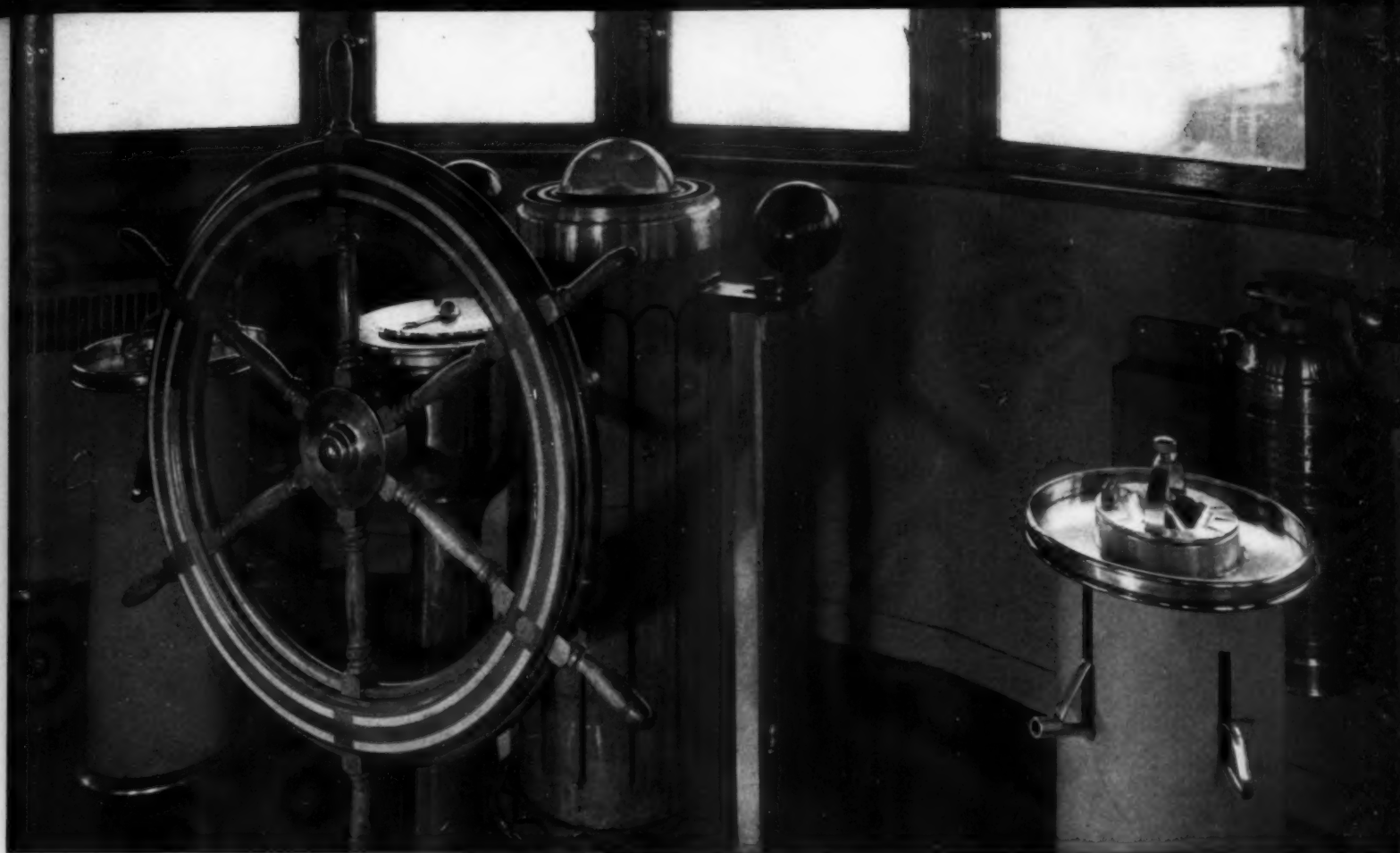
View of the combination galley and crew's mess. Note stainless steel sink and table trim.



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a good ship

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View looking forward in the pilot house.

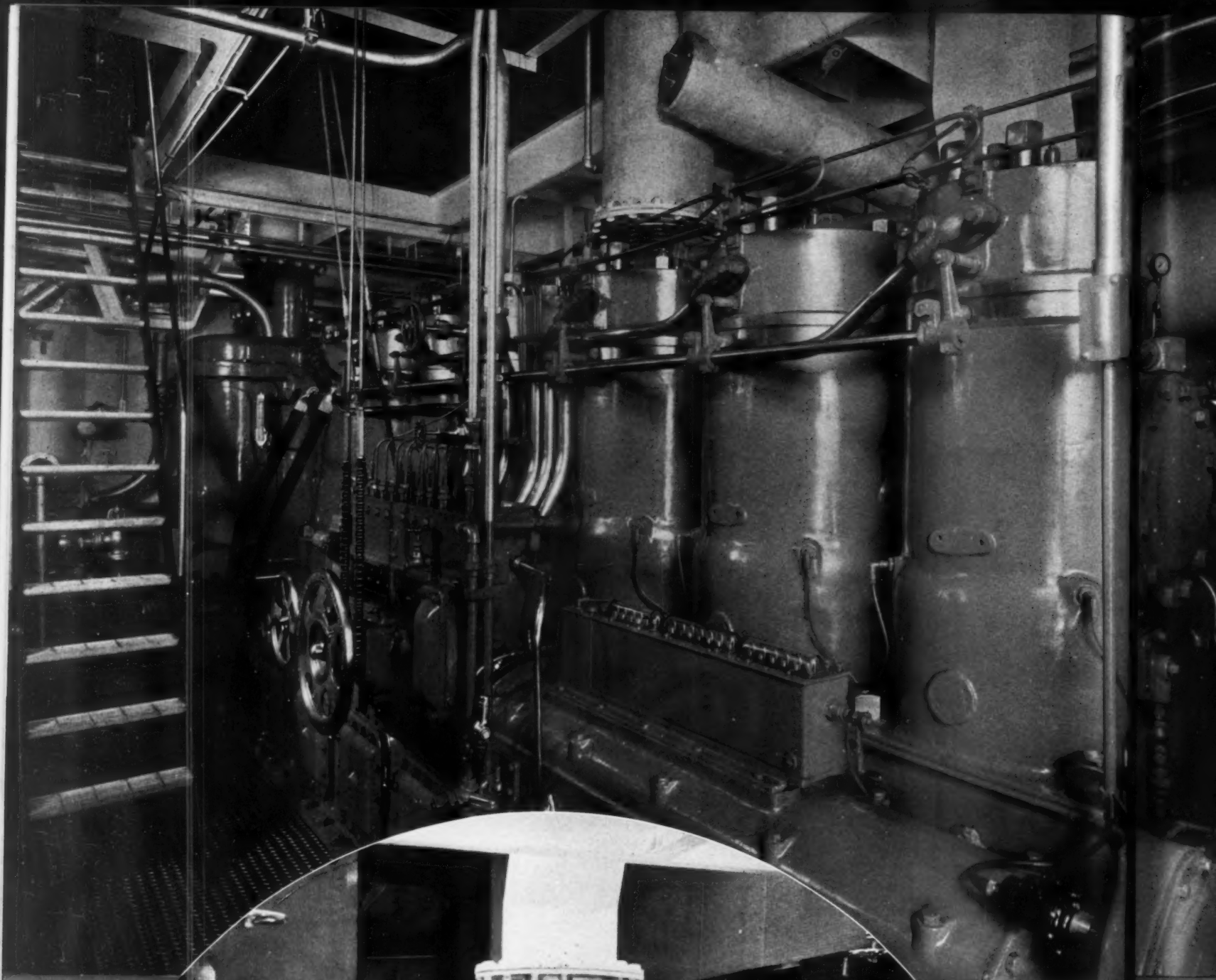
of his job and of his life—it is but fitting that a good ship be named after a good man.

So now let me talk about the ship *A. C. Dodge*, one of a series of coastal tankers which have been more or less standardized by the Maritime Commission. She is a bit over 220 feet long, with some 13 feet in beam. Welded steel construction, single deck, full center expansion, trunk type, with rigged stem and cruiser stern. It takes from twenty-three to twenty-five tough customers to run her and they get no rest. This good ship has a job to do and that job takes every hour—and so she works, without a let-up.

This tanker, named after the Vice President of Fairbanks-Morse, is appropriately powered with F-M main Diesel engine and auxiliary equipment. The chief propulsion unit is a 7 cylinder, Model 37E14. It is equipped complete with scavenger air pump, fuel supply pump, marine governor with manual speed control, cast steel engine and propeller half-couplings, thermometers for oil and water, marine type thrust bearings, water cooled exhaust manifold, and pyrometer conduit assembly. This main engine embodies such features of design and construction as oil-cooled pistons, open-head

combustion, differential injection valves for back-flow scavenging. The lower engine room that houses this chief unit includes such quality standard equipment as a Schutte & Koerting heat exchanger, duplex oil strainer and lube-oil cooler, a Brown pyrometer and thermocouples, and a Bacharach Manometer for the scavenger pump. The auxiliary needs are handled by a combination F-M auxiliary set consisting of a Fairbanks-Morse 2-cylinder, 20 hp. marine Diesel, a 12 kw. F-M generator, a 135 gpm. Northern Rotary Pump, and F-M air compressor, all mounted on a common sturdy sub-base. The propeller is direct coupled to the Fairbanks-Morse main engine and is of special design being three-blade bronze of Ferguson make. The Maxim Silencer people furnished their No. 36 Model SCF spark arrestor exhaust silencer and their No. 32 Model MUA air intake silencer. The air starting needs are supplied by three 30 in. x 96 in. BMIN Scaife air tanks. The extensive pumping equipment is also all Fairbanks-Morse. The fuel oil transfer pump is a 2 in. F-M Type 5, bronze fitted rotary pump, direct connected and mounted on a common sub-base with a 1½ hp., 115 volt, D.C. F-M marine type electric motor. The lubricating oil transfer pump comprises a pair

of ¾ in. F-M Type 7, all bronze rotary pumps, direct connected and mounted on the same base, to ¼ hp., 115 volt D.C. Wagner Electric motor. The standby motor driven salt water pump is a 1¼ in. F-M bronze fitted centrifugal pump at 400 gpm. vs. a 30 ft. head, direct connected on the same base with ¾ hp., 115 volt, D.C. Wagner Electric motor. The fresh water and sanitary systems are taken care of by a pair of Fairbanks-Morse 150 gpm. automatic water systems, complete with a 42-gallon galvanized tank in the case of the fresh water system and a similar one, only of copper for the sanitary system, the latter being outfitted for salt water service. These tanks were furnished by L. O. Kovens. The standby motor driven oil and water pump is a Fairbanks-Morse unit, comprising a 120 gpm. rotary lubricated oil pump, a 250 gpm. centrifugal circulating water pump and a 10-hp., 115 volt F-M marine type electric motor, all mounted on a common base. This unit is used for before and after service and in addition is of sufficient capacity to serve standby needs for the built-in pumps of the main engine. The *A. C. Dodge*, though built for the arduous service it must perform, is fitted with a wealth of appointments that are designed specifically for crew comfort. The pilot house



To the left is
main engine
cylinder Dies

To the right
and cooling
pump



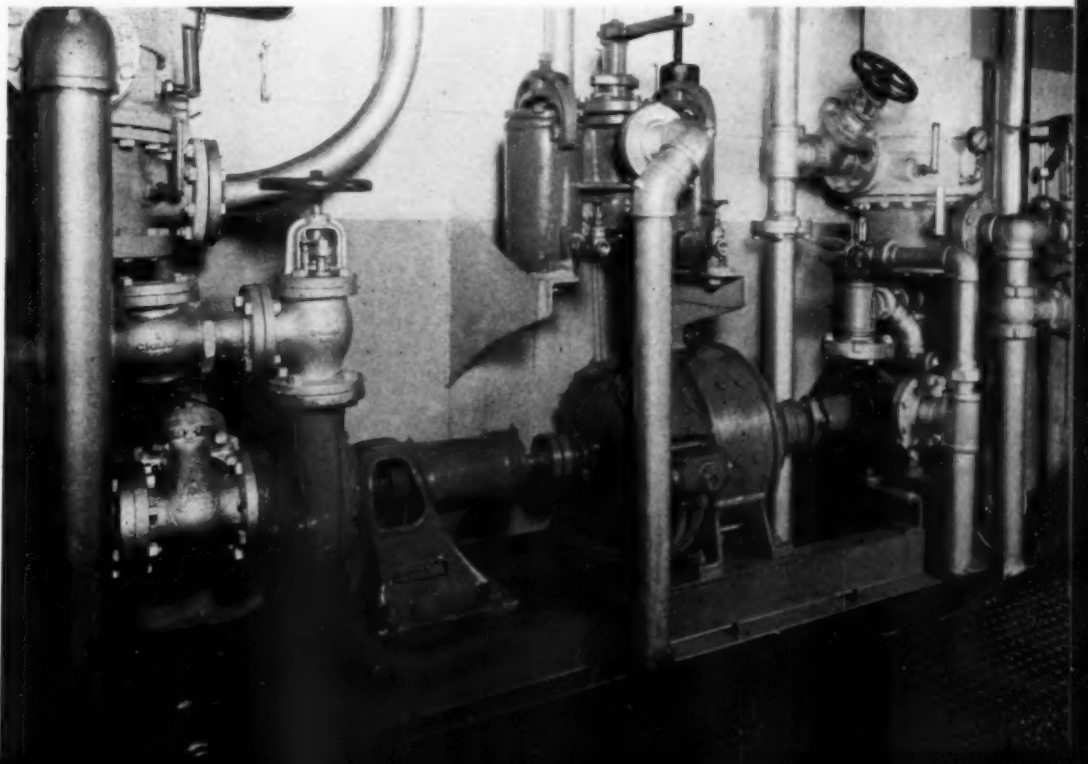
Upper engine room view showing F-M remote engine control stand and gauge, panel with Weston tachometer.

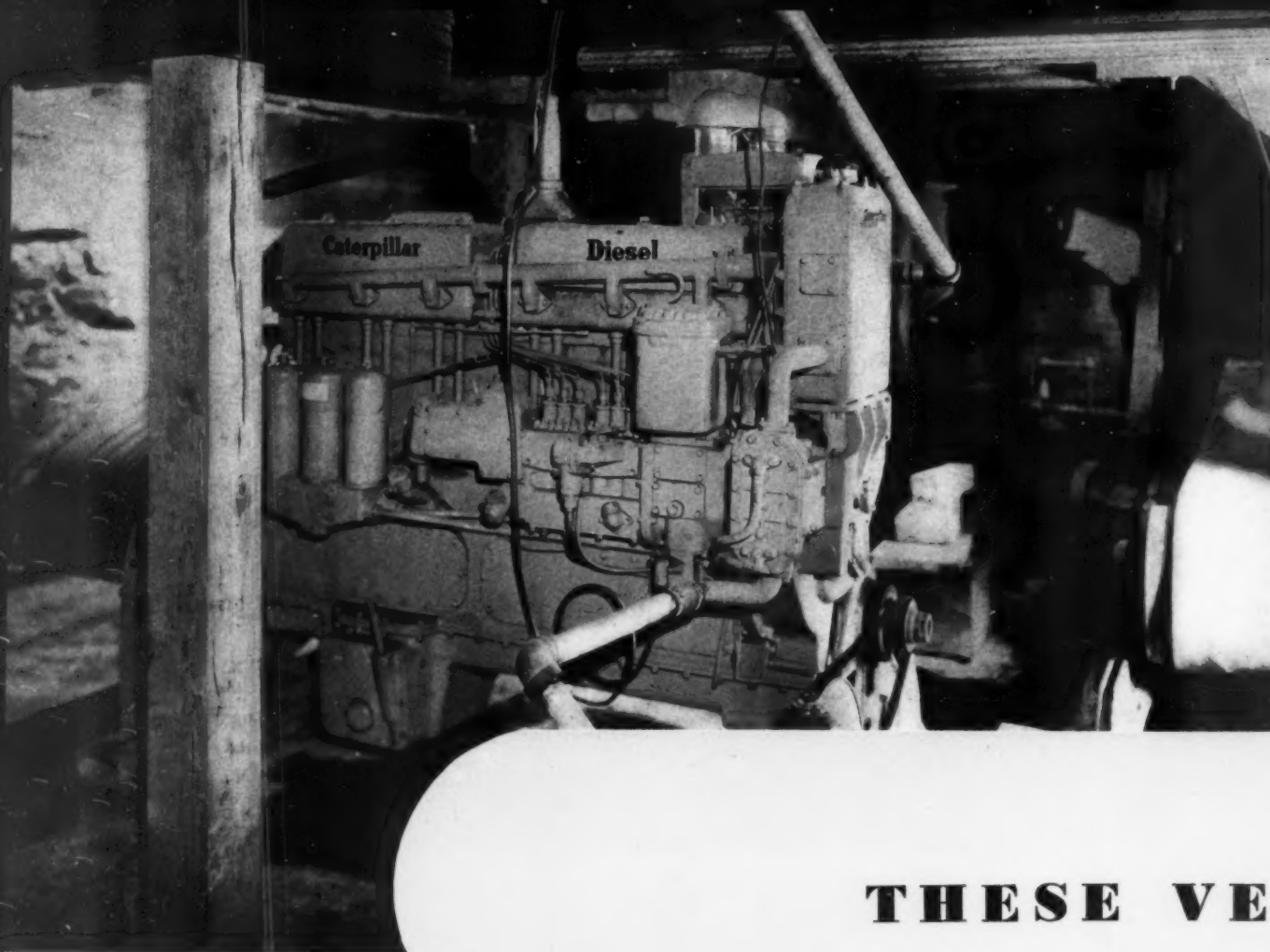
and crews' quarters are both located aft and their furnishings are such that the greatest possible comfort is made available to each member. The spacious crew's staterooms are arranged for two men with ample storage facilities and many other little conveniences that go toward alleviating the strain of their difficult and dangerous voyages. All quarters on board are fully insulated against climatic extremes with Johns Manville Rock Wool, while deckings are covered with a plastic non-slip flooring.

In the large and well equipped galley that not only furnishes excellent meals to the tanker crew, but also serves as an informal lounge for "chewing the fat," is the latest equipment to facilitate the cooks' duties. There's a large oil burning range, electric refrigerator, water coolers, toasters, etc. The single staterooms, shared by the Captain, Chief Engineer and First Mate, have both space and attractiveness. The propulsion and auxiliary equipment on board has been tested in many similar applications.

To the left is shown the "A. C. Dodge" main engine, a Fairbanks-Morse six cylinder Diesel.

To the right are seen the raw water and cooling water, F-M motor driven pump.





This six-cylinder, 150-hp. Diesel, operating ten hours a day, powers machinery producing 50 bbl. of flour per day, one ton of feed per hr., 600 lbs. corn meal per hr., and cleaning 1000 bu. of wheat per day, using four gals. of fuel per hour.

DIESELIZED

MILL

Boldt's mill is typical of hundreds of cross roads mills throughout this country.



THESE VERSATILE

AN interesting installation is that of a Caterpillar Diesel engine in the Boldt Milling Company, located in Waynetown, Indiana. In these times, steady dependability, coupled with economic operation, is paramount. According to R. G. Landis, superintendent of the mill, the new engine is giving just that. Boldt Milling Company installed the sturdy Diesel March 1, 1942, and has been operating it ten hours a day, twenty-six days a month. Thus far, the engine has used approximately four gallons of 8.8 cent Diesel fuel oil per hour. Driven machinery in the mill includes a fifty-barrel flour mill, feed room-meal roll, steel cutter, large cleaner, and a sheller. In addition to flour, the mill produces one ton of feed each hour, 600-700 pounds of corn meal hourly, and cleans 1,000 bushels of wheat per day. Mr. Landis believes that steady power, permitting the Diesel engine to run all day at uniform speed, is one of the main features. The engine is equipped with an automatic shut-off which, he says, gives the mill personnel a lot of confidence and in this way relieves much worry.

Three Diesels which keep ing twenty-f

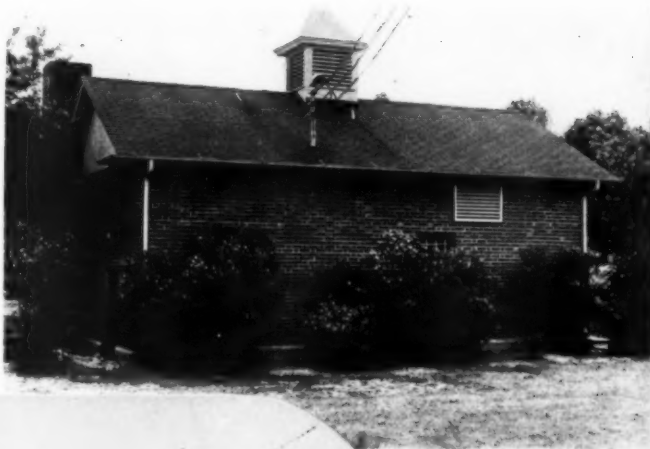
Central buil Publishing lighted and

P RINTING and distributing 600,000 units of religious literature per month is a day-and-night, every-day-of-the-year job at the Free Methodist Publishing House, Winona Lake, Indiana. Thirty-one machines, including linotype, monotype, printing press, and bindery equipment, depend upon continuous power to keep this volume of printed matter flowing out to the field. Last February, three Caterpillar Diesel-electric generating units took this responsibility over from the utility after H. Gaddis, manager of the publishing house, was satisfied himself that Diesel economy and dependability would definitely meet the requirements of this enterprise. The Diesel applications shown on these two pages typify the thousands of industries throughout this country that can and will be Dieselized.

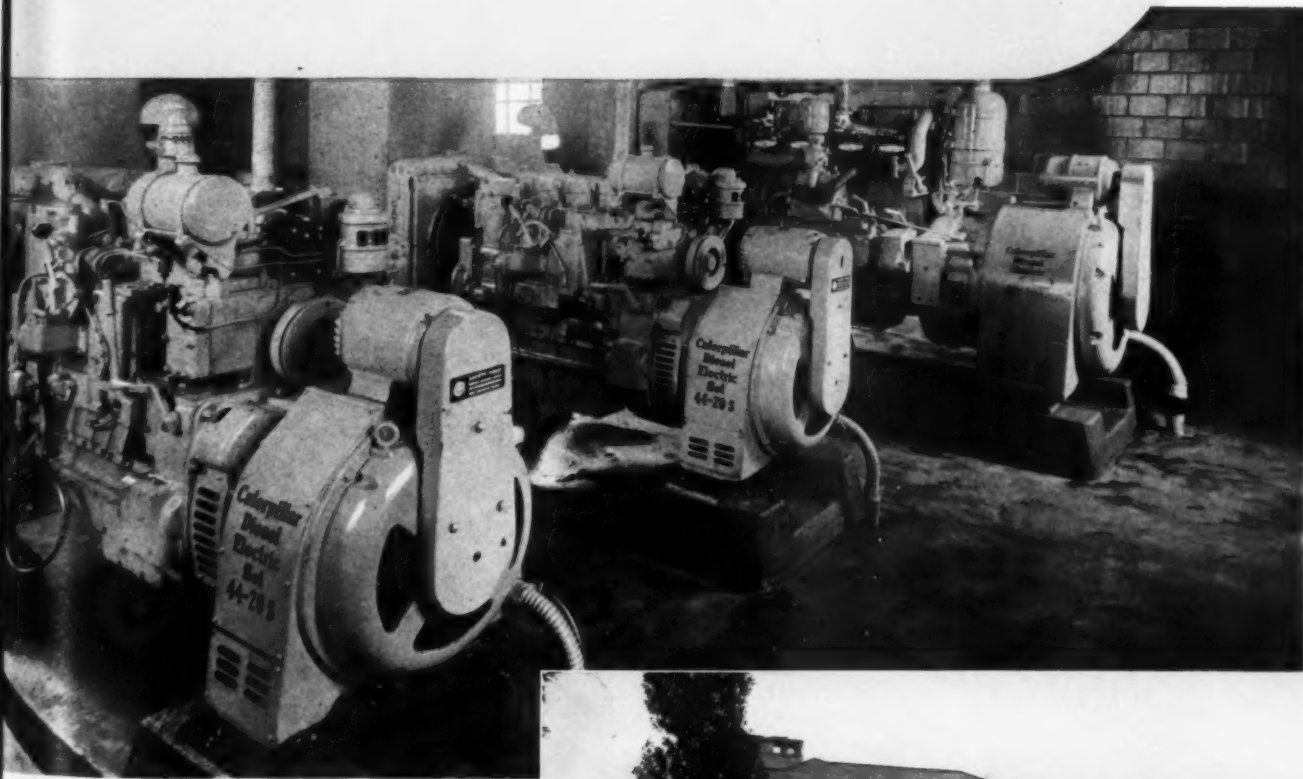
DIESELS SPREAD

THE GOSPEL

Power plant building of the Free Methodist Publishing House, Winona Lake, Indiana, a full Dieselized printing operation producing 600,000 units of literature per month.



AT THE DIESELS . . .



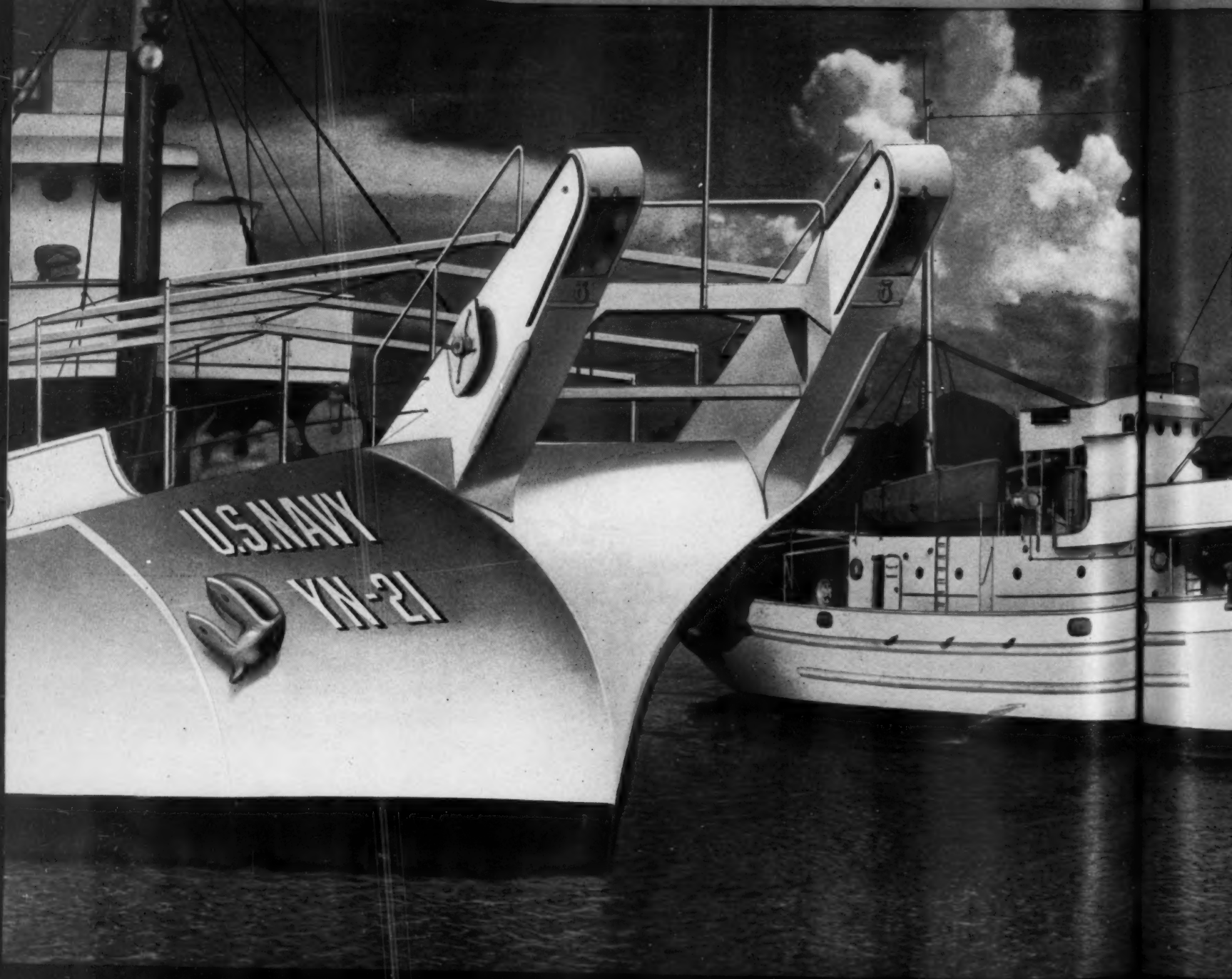
Three Diesel-electric generating sets which keep the printing machinery going twenty-four hours a day.

→
Central building of the Free Methodist Publishing House which is entirely lighted and powered by Diesels.



DOING ***DOUBLE DUTY*** FOR THE NAVY

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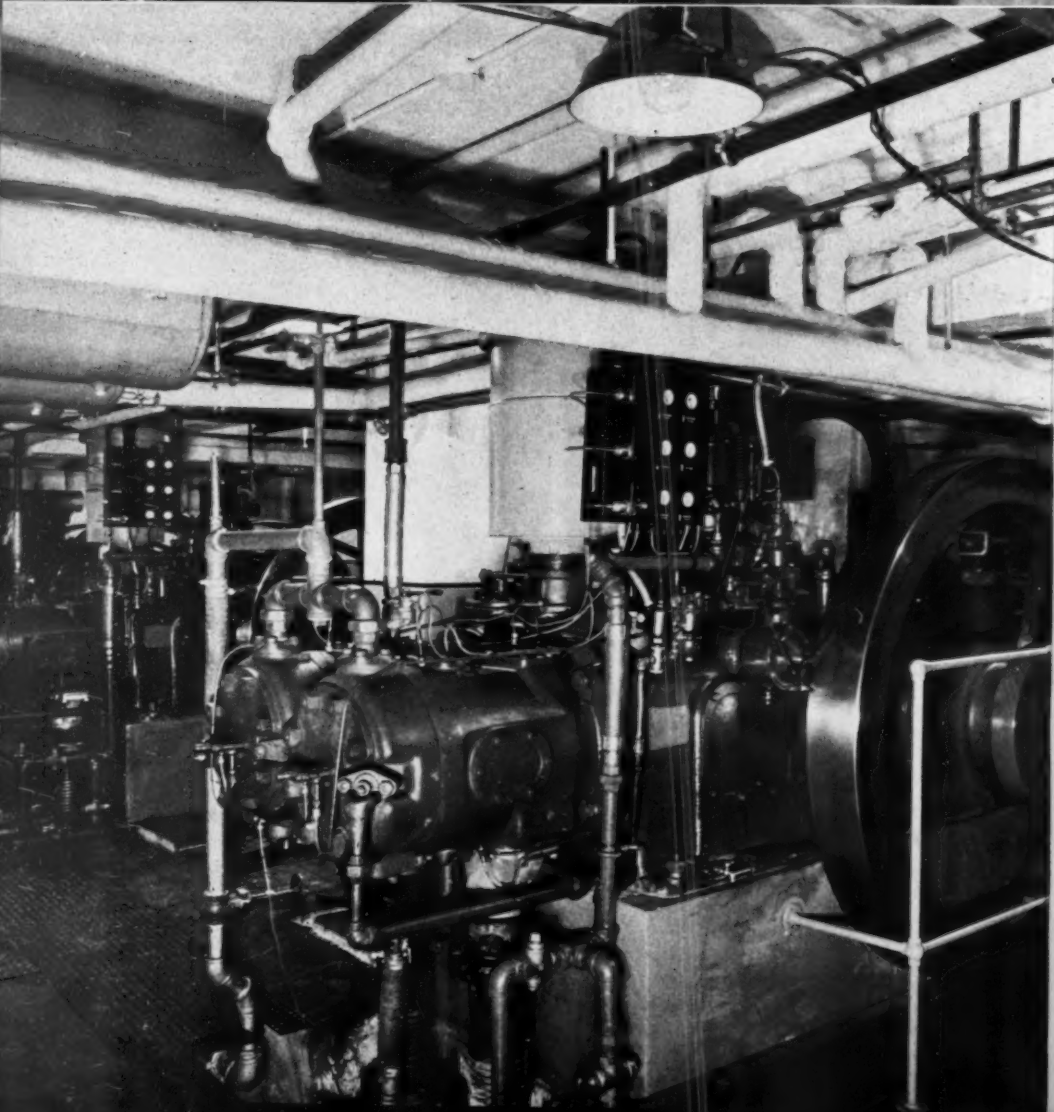
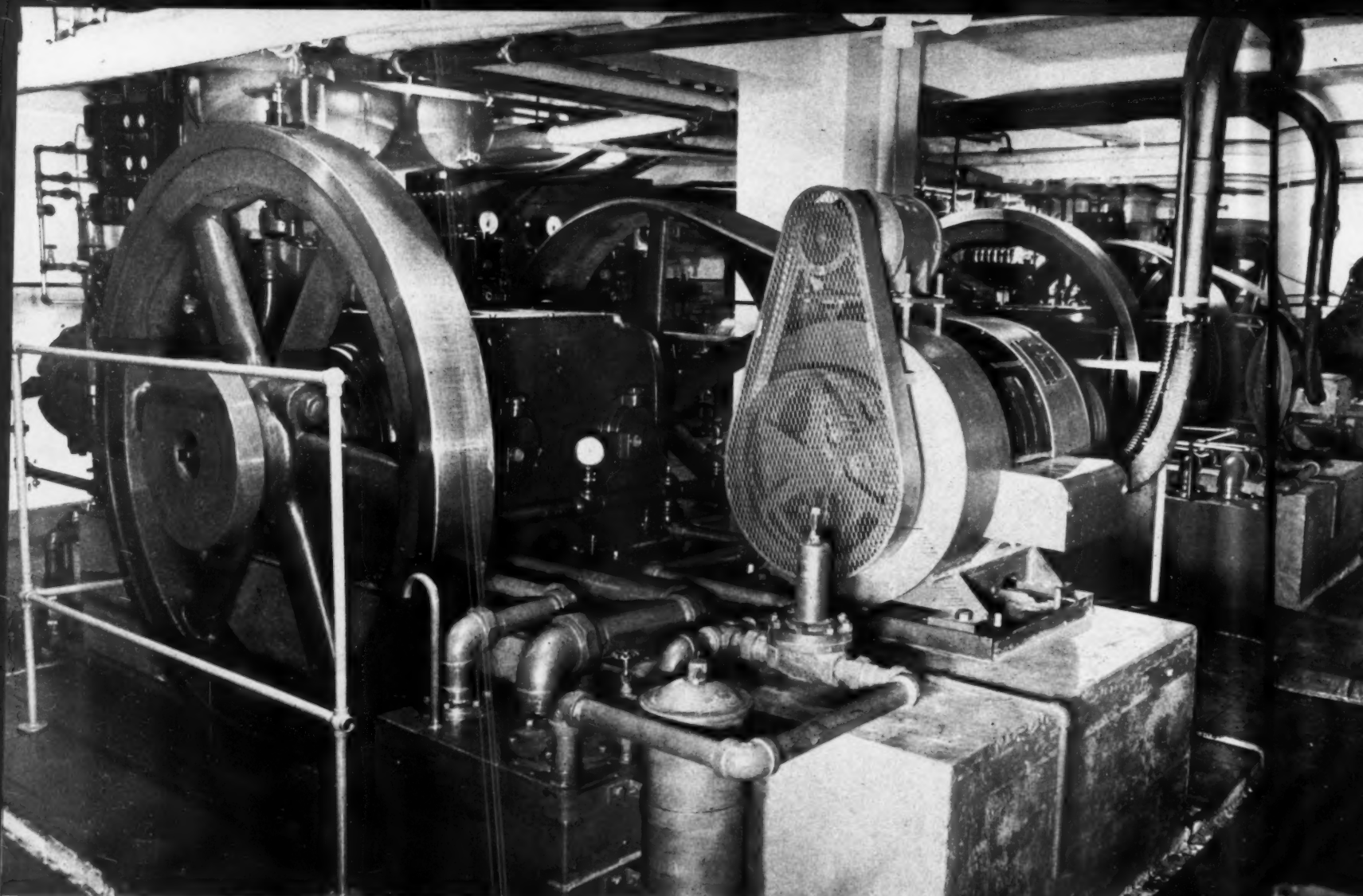


These U. S. Navy vessels have a special war job to perform—that of laying and maintaining anti-submarine nets. So their power plants must not only propel them, but drive their net-tending machinery, too—a double job the Navy is entrusting to GM Diesel-Electric Drive in many such craft already launched and now building.

CLEVELAND DIESEL ENGINE DIVISION
General Motors Corporation

GENERAL MOTORS
DIESEL






Views above and left show the Cooper-Bessemer Diesel-generating units which supply power for all electric services in Hotel Bradford, New York. The three units are mounted on Korfund isolation mats. Note Purolator fuel filters.

Norman Schaffer, president of Consolidated Diesel Electric Co., and Henry Forster, Chief Engineer of Hotel Bradford are shown below.





WITH the possible exception of an Indian potentate's court, there is no place on earth where the demand for service is more exacting than in a fashionable hotel. The guest's needs must be served promptly, unobtrusively, efficiently—with never, never a faltering step. The servant known as electric power is no exception. Elevators must rise and fall swiftly and smoothly; the lights must glow strongly with nary a flicker; the gentleman in Suite 198D must always have power for his fan, his refrigerator, his reading lamp, his electric razor, and his electric clock. The management must answer for it if there ever is a failure.


The Hotel Bradford, a sixteen-story apartment hotel on 70th Street, New York City, has just put into service three 110 hp. Cooper-Bessemer Diesels which are providing, without standby, every light and power need for the entire establishment. Not only does the service come up to specifications, but the plant presents the owners with an estimated annual saving of \$9,000.

Designed and installed by Consolidated Diesel-Electric Corporation under the personal supervision of its president, Norman Schaffler, this plant has every refinement deemed necessary to insure a high level of performance. Huxley Madeheim was consulting engineer. The first move was to select heavy-duty prime movers and make provision for adequate reserve power. The Bradford's 165 apartments, four elevators, restaurants, tap room, and other public rooms consume about 450,000 kwh. a year. The load runs between 50 kw. and 70 kw. during the day, rises to a peak of 120 kw. during three evening hours, and drops to a low of 30 kw. after 11 p.m. To meet this demand, the engineers chose three 2 cylinder, mechanical-injection Cooper Bessemer Diesels, of 10½ in. bore and 15 in. stroke, developing 110 hp. at 327 rpm. These horizontal engines are of the type which have been highly successful in heavy industrial service. This is the first installation of its kind in a hotel or similar building. Each unit drives through Worthington V-belts a 75

kw. Electric Machinery, a.c. generator with belted exciter. One engine can carry the full load for 21 hours a day with two required for three hours to handle the peak demand. Thus there is always one unit in reserve. Though the late night load is low, the average load factor for 24 hours is better than 55 per cent, permitting satisfactory operating economy.

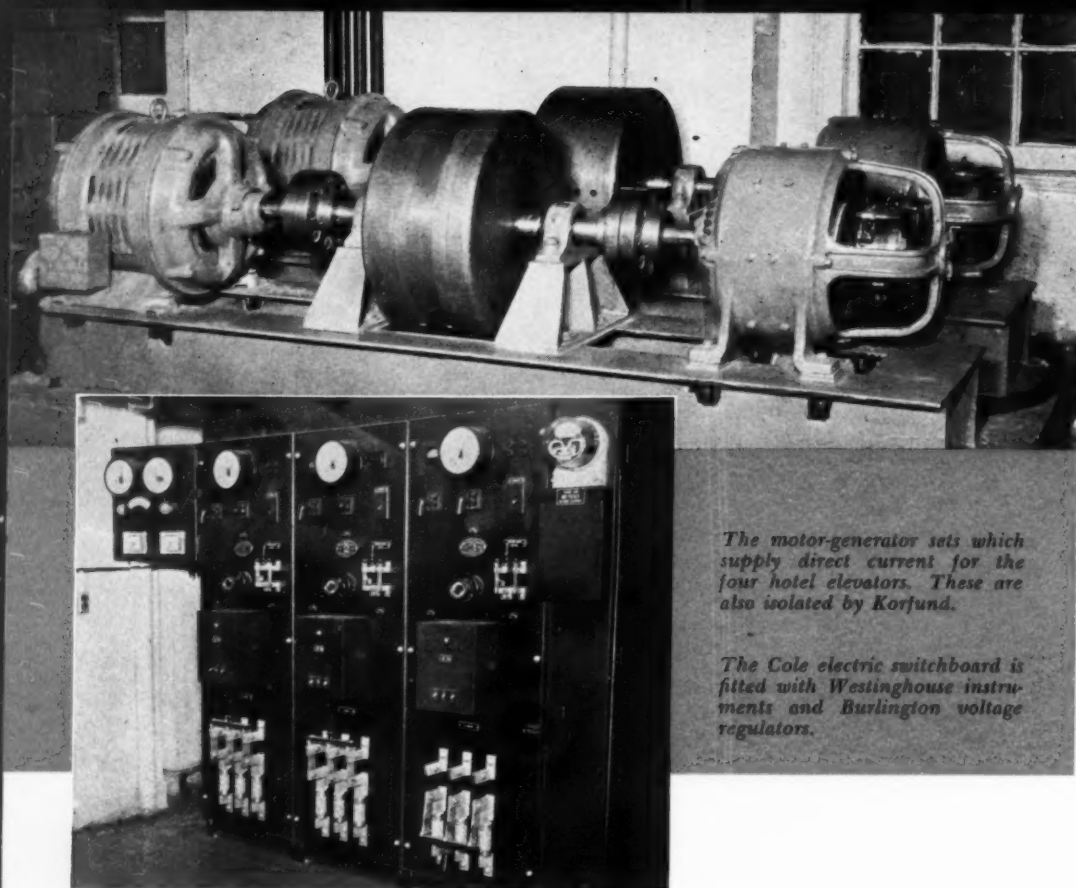
The four elevators presented a particularly difficult load. Each is driven by a 25 hp. d.c. motor and the constant starting and stopping throws a heavy swinging load on the power plant. In addition, there are eighteen ventilating fans running on d.c. current. This important d.c. load is carried by two special motor-generator sets, designed and constructed by Consolidated Diesel Electric Corp., each consisting of a 25 hp. a.c. Westinghouse motor and a 15 kw. Consolidated d.c. generator. Between each motor and generator is a 1600 lb. flywheel resting on two Link Belt pillow blocks and connected by Ajax couplings. This heavy flywheel, turning at 1700 rpm., absorbs the shocks of the elevator motors so well that a single motor-generator set can carry the whole d.c. load, leaving the duplicate unit in reserve. There is no a.c. flicker whatsoever.

The first essential in designing this plant was to insure against transmission of noise and vibration to the floors above, as well as to the surrounding buildings. The major vibration problem was solved by isolating the engine foundations with Korfund isolation materials. Each engine with its generator is installed on a concrete block of carefully predetermined mass. The Korfund isolation mat separates each concrete block from the subbase which is embedded in solid rock. Two of the generating units are mounted on a common foundation and the third unit rests on a similar individual foundation. The two separate foundations are required because of a column which is located almost in the center of the engine room. Utilizing a method worked out by Korfund engineers, the ends of the foundation are sloped in



DIESEL

ROOM SERVICE
By WM. H. GOTTLIEB



The motor-generator sets which supply direct current for the four hotel elevators. These are also isolated by Korfund.

The Cole electric switchboard is fitted with Westinghouse instruments and Burlington voltage regulators.

at a 45° angle. This resolves the horizontal forces into their proper components for greater isolation efficiency. This treatment has resulted in the satisfactory isolation of all operating frequencies; in fact, it made possible the installation of these Diesel engines in such a critical location. To complete the isolation of the engines, the exhaust, cooling water, fuel, lube and starting air lines are connected with Pennsylvania Flexible hose.

The problem of noise was handled with equal effectiveness. Exhaust gas from the two cylinders of each engine Y into a 6 in. line leading to a horizontal Maxim silencer under the engine room floor. The gas then goes through another line to the adjoining boiler room where it passes through a second horizontal Maxim and then up the existing smoke stack. Thus, there are two silencers for each engine and the exhaust blast becomes an inaudible whisper. The exhaust lines are well insulated and rock wool is packed loosely around the silencers under the engine room floor. Floor plates permit easy access to every bend in the exhaust lines. To silence air intake, there is an Air-Maze combination muffler and oil bath air filter mounted on each engine frame. Though there is little noise in the engine room, the precaution was taken of installing a sound-insulating ceiling. The end result of this battle against noise and vibration is the complete and absolute elimination of every trace of Diesel operation even on the floor directly over the engine room and in adjacent rooms.

Two motor-driven Worthington centrifugal pumps rated at 60 g.p.m. vs. 40 ft. head take the soft cooling water as it flows from the engine jackets through a common header and put it through a Davis heat exchanger which supplies hot water for use in the hotel. From the exchanger the jacket water flows to a Buffalo evaporative cooler and then back to the engines. A Sarco blender valve holds the water at 140 degrees by bypassing part of the flow around the cooler. One pump is sufficient to handle the plant and the second serves as a standby. Both pumps can be bypassed. Makeup water is fed to the system from two interconnecting 5000 gallon tanks on the hotel roof through a Thomson meter and a Ford pressure regulating valve which reduces pressure from 80 lbs. to the 20 lbs. desired in the system. As a further safeguard, it is possible to introduce water under city pressure into the engine cooling system. This is accomplished automatically.

Horizontal engine bearings are lubricated effectively by the splash system but these engines have refinements of design that insure proper cooling and lubrication. Oil from the crankcase drains to a sump tank beside the engine at which point it is picked up by an engine-driven pump and put through a Ross oil cooler. From the cooler the lube flows to a Fisher pressure regulating valve which sends part of the oil through a Purolator filter back to the sump tank and the rest through drilled rods to cool the pistons. While oil in the crankcase lubricates the bearings, the cylinders are sup-

plied by McCord force-feed lubricators. Socony Vacuum DTE No. 3 is used throughout the plant. The time of oil changes will be determined by laboratory test.

The Socony Vacuum MFD No. 2 fuel is unloaded by gravity to a 2,000 gallon storage tank in the subbasement and transferred by a motor-driven Ketchum gear pump to the three 54 gallon elevated day tanks in the engine room. The fuel flows by gravity from the day tanks through individual Vesta meters to the engines. There is an American Bosch injection pump for each cylinder and Pickering centrifugal governors regulate the quantity of fuel delivered to the cylinders. The day tanks are arranged so that fuel from any one can be supplied to any engine. Two Purolator filters clean the fuel for each engine.

Despite the automatic features, there is a complete alarm system to summon the operator in case of trouble. There is a gauge board on each engine with pressure gauges and Penn switches which sound an alarm if water temperature in any cylinder goes too high, lube pressure in any engine drops too low, if plant water pressure is either high or low. An Ex-Cell-O annunciator tells the operator exactly what and where the trouble is. There is a remote control solenoid valve for shutting down the engines in an emergency.

Another automatic device keeps pressure in the three Worthington starting air tanks at 250 lbs. The Worthington V-type dual-drive compressor is V-belted to an electric motor controlled by a Square D pressure switch which starts the motor when pressure in the air tanks drops below 210 lbs. The compressor also can be belted to a Wisconsin gasoline engine. The three-panel Cole Electric Co. switchboard holds a Burlington voltage regulator for each engine in addition to Westinghouse instruments. There is also a Cramer engine-hour meter for each of the three Diesels. There is a one-panel board for d.c. current.

In past years, Samuel Lebis, owner of the Bradford and eight other hotels in New York, Washington, Pittsburgh, and other cities, paid about \$13,500 a year to power and light the Bradford. This meant an average cost of 9 cents per kw.hr. Experience shows that Diesel costs will be less than \$4,500 a year or under a cent a kwh. Savings of this magnitude will pay off the entire cost of the plant in five years and thereafter will give the Bradford substantial profits. This Diesel plant is indeed the perfect hotel servant.

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Hauling groceries from Los Angeles, California, to Bisbee, Arizona, and cattle on the return trip to Los Angeles, this truck unit covers an annual distance of 100,000 miles. It is a Kenworth Model 524, with Cummins 200 hp. supercharged Diesel operating through Timken dual drive transmissions.

DIESELS ON EL CAMINO REAL

By JIM MEDFORD

SOUTHERN California's Trail of the Padres, El Camino Real, which marches between the early Spanish Missions, echoes today to the purr of Diesel exhaust and whine of high speed gears where, but a century and a half ago, the Christian Fathers by sandal and staff toiled between the revered and now historic monasteries they erected in a strange and hostile land. Such was the beginning of one hundred and fifty years of progress that transformed a trailless wilderness into a garden spot; that today houses in its museums the travel relics of yesterday, and the day before, marking its transition from sandal to automotive—from faintest of trails to concrete ribbons that join with others to thread the nation, reaching 50,000 of the 125,000 communities which otherwise would have to depend on

primitive trails and transportation, taking many days, where it takes but a few hours with fast modern truck service.

In these 50,000 communities live some 8,000,000 persons who depend on this modern fast truck service for existence as we know it in the American way. And if this is true in general, it is doubly so particularly in the eleven Western states where less than ten per cent of the nation's population are scattered over forty per cent of the total area and are located miles and miles from railroads and distribution centers. At most, a three-day suspension of truck service would mean a critical shortage of essential commodities, so short are merchandise stocks carried today. In this great empire within a nation, the fast freight truck

is coming into its own with the sky the limit—the operators know it and are rising to the opportunity with the finest of equipment combining speed, dependability, long life and economy for the operator—low freight delivered cost, minimum loss and damage, fast service for the customer.

This is only possible by the economy characteristic of the Diesel engine—a Diesel truck travels twice the distance for the same fuel and lube oil cost as a gasoline truck. And, added to that, higher average speed of the Diesel truck permits quicker turn-arounds with the same equipment, giving same amount of service with fewer units, eliminating additional fleet unit expense. For a minute, let's look at some performance records.

Out of Los Angeles, on its fast freight run to Phoenix, Arizona, the Comet Freight Lines operates heavy duty 150 hp. Cummins Diesel engined Kenworth trucks and trailers with gross capacity of 68,000 pounds each. On the run of 407 miles, fuel consumption is 68 gallons, time is around sixteen hours through rough country, with a major overhaul at 75,000 mile intervals. Savings, figured at 1.5 cents per mile over gasoline trucks on an estimated 80,000 annual mileage, is the far-from-small sum of \$1,200.

Another Los Angeles concern, one that offers specialized services, is Garrett Freightways, Inc., operating between California and Utah points. Shown in the accompanying photograph is one of its two-unit highway trains consisting of a Kenworth three-axle truck and trailer powered with a 150 hp. Cummins Diesel. This is a fancy refrigeration unit with special body design and smart white sidewall tires. They live up to their appearance, too. On an average 85,000 annual mileage, major overhaul is rendered at 75,000 miles; generally, just rings, bearings, and tune-up; oil is changed each 1,000 miles in the five gallon crankcase; operation cost is around 15 cents a mile.

But when it comes to being versatile, you can hand it to the Stevens Grocery Company, also of Los Angeles. Using Kenworth equipment with Cummins 200 hp. supercharged Diesels on the run between Los Angeles and Bisbee near the Arizona-Mexican border, a round trip of approximately 1,100 miles, the mileage operation cost is 16 cents. These trucks, fitted with five-speed transmission, provide the driver



Comet Freight Lines operates this heavy duty 150 hp. Cummins Diesel, Kenworth dual drive truck on fast freight run between Los Angeles, California, and Phoenix, Arizona. It has a Timken worm drive and two differentials.

Garrett Freightways, Inc., refrigeration service between California and Utah points; units made up for this specialized run by Kenworth. Power is a 150 hp. Cummins Diesel operating through Timken differentials and Brown-Lipe transmission combination.

Cattle hauling is a big item in California's highway truck movement. Here is one of the units operated by Dick Freeman of Paso Robles, in the northern part of the state. Engine is a Cummins 150 hp. Diesel with Brown-Lipe transmission in a Kenworth truck with dual drive.



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↑ Diesel highway oil tankers operate on a wide range of Southwestern runs, paying big dividends. This Kenworth is four-wheel drive, powered with a Cummins 150 hp. Diesel with dual Brown-Lipe transmissions.



with a choice of fifteen selections forward. So skillfully do these men handle this heavy equipment over the humps that after 100,000 miles only rings and bearings are needed—crankcase oil being changed each 1,000 miles. On the run to the border, the load is groceries, but on the return leg, of all things, it's cattle.

Speaking of cattle, livestock transportation is a big part of the truck loading in California. Just a bit less than 60 per cent of the nation's beef on the hoof moves by truck with the Golden State well up in the front rank with Arizona and other western states. Among other things, this is due to the fact that shrink-

age by truck is under three per cent, whereas movement on the hoof reaches as high as eight per cent. So, even for comparatively short distances, the truck's the thing. Besides, they load and unload themselves, and "That's what I have been looking for in cargo," remarked more than one operator.

Dick Freeman of Paso Robles is one who likes to handle livestock loads and, that he may do it the right way, he uses Cummins Diesel engined Kenworth two-unit three-axle trains on the runs in Northern California. These 150 hp. Diesels operating through four-speed transmission dual-drive units carry a gross load

of 76,000 pounds at a fuel cost of 1 1/3 cents a mile with overhauls spaced at 100,000-mile intervals—an average of sixteen months' straight operation between times out for major repairs—good going in any man's language.

But while we are on this interesting subject of highway transportation, let us add one other commodity that figures large in truck tonnage—petroleum and its products. Like cattle, it loads and unloads itself without lifting or lugging—literally pours itself in and out of the highway oil tankers, fleets of which roll over a wide range of California and Southwestern runs, paying good dividends in the form of operating economy and consistent time-saving, plus high daily and monthly low-cost road mileage—something no other type of transportation has been able to equal.

The tank truck shown above is a four-wheel-drive Kenworth with Cummins 150 hp. Diesel driving through standard dual transmission. Its capacity is 6,200 gallons and it is in service on the heavy Los Angeles to Phoenix, Arizona, run of 407 miles. It averages six miles to the gallon of 8-cent fuel; lube oil is changed each 1,000 miles; does around 80,000 miles annually with overhaul at 75,000 miles of operation, which is good service.

THE keynote of today's war production requirements is—more power from existing equipment with reliability. The use of Elliott-Buchi turbochargers with the Buchi system of turbocharging is one means of securing additional power output from four-cycle Diesel engines. This method of supercharging has been in general use throughout the world for a number of years, and is now widely accepted in the United States. The combined output of engines utilizing this method exceeds 2,000,000 bhp., covering a wide range of individual engine ratings up to 6000 bhp.

Numerous types and sizes of engines of conventional design have been turbocharged with relatively few internal design changes, and with substantial increases in output. Such applications have been made with success to existing engines in the field, as well as to new engines. The practical increase in rating will vary somewhat, depending on the original design, unsupercharged rating, and service conditions. As a general rule, the power increase will be at least 35 to 40 per cent, and greater in some cases—where the engine design is particularly well suited to turbocharging.

The Buchi system can be applied to four-cycle engines for practically any service, and with few limitations as to type, size, or speed, if the engine is of more or less conventional design. Applications have been made successfully to both air and solid injection engines, as well as to low-, medium-, and high-speed engines. In general, the open type combustion chamber with central injection has given the best results.

The turbocharger unit is entirely self-contained, and is connected to the engine only through the exhaust gas and air manifolds. It consists of a gas turbine driven by the gas exhausted from the power cylinders of the engine, and a centrifugal blower mounted on a common shaft, which supplies all the air required by the engine, under pressure, through the conventional air intake manifold. The turbine utilizes a part of the energy in the exhaust gas which is otherwise wasted.

The low-pressure air delivered by the turbocharger serves a dual purpose. First, it blows through the combustion space and valves, thus scavenging the residual gases otherwise left at the end of the exhaust stroke, and replaces these hot gases with cooler, fresh air. Second, it results in a cooler air charge of greater den-

* Assistant Director, Commercial Research Department, Elliott Company, Jeannette, Pa.

SUPERCHARGING FOUR CYCLE DIESEL ENGINES

BY J. P. STEWART*

sity, i.e., heavier weight, at the end of the suction stroke. The combined effect of this scavenging and pressure-charging permits the combustion of a greater quantity of fuel without harmful effects to the engine, and consequently a higher output, than with a normally aspirated engine of same displacement.

The process employs a method of creating timed pressure pulsations in the exhaust gas manifolds. This is accomplished by the timing of inlet and exhaust valves, and proper combinations and dimensions of exhaust manifolds and turbine nozzles. The valve timing of a Buchi turbocharged engine differs essentially from that of the same engine normally aspirated, in that the exhaust valves close later and the inlet valves open earlier, thus providing a greater period of valve overlap during which both inlet and exhaust valves of the particular cylinder remain open when the piston is near top dead center.

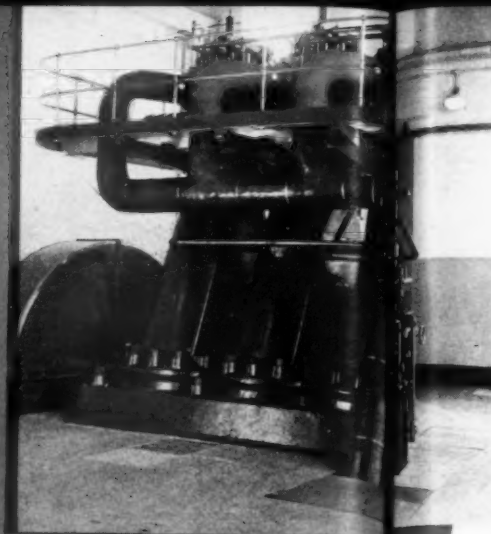
The initial high pressure of the gas leaving each cylinder at the beginning of the exhaust stroke is transformed effectively into kinetic energy by the proper proportioning of exhaust manifolds and turbine nozzles. This energy is used to drive the turbine. After the initial surge of the exhaust gas from the cylinder, the pressure in the exhaust manifold drops nearly to atmospheric, while the air pressure from the blower remains considerably higher. The inlet valve is then opened before the exhaust valve closes, during which period fresh compressed air blows through, scavenging the clearance space, cooling the cylinder walls, pistons, and valves, and mixing cool air with the hot exhaust gas in the manifold. After the exhaust valve closes, the inlet valve remains open to about the beginning of the compres-

sion stroke, when the cylinder is filled with relatively cool, fresh air under pressure. In order to prevent interference between the exhaust gas impulses, and to prevent blowing of exhaust gas from other cylinders during the scavenging period of a given cylinder, separate manifolds from groups of either two or three cylinders are connected to separate banks of nozzles in the turbine.

Adequate scavenging is equally as important as the pressure charging in the cylinder before compression. High density of charging air, the primary object of all supercharging methods, is achieved with the Buchi system by low temperature of the air and moderate pressure, rather than by excessive charging pressures. This gives the desired high bmep. ratings without appreciable increase of the maximum firing pressure, as compared with unsupercharged engines.

The application of Elliott-Buchi turbochargers to existing engines offers the user a number of distinctly attractive features, among the most important being:

1. A substantial increase in output with a very small increase in weight, and generally no increase in otherwise useful space. New foundations and additional engine room space are thus not required, as would be necessary if new engines were installed to provide the additional output.
2. The rating of engines operating at high altitudes can be increased. Sea level rating can be restored to engines at altitudes of approximately 12,000 to 14,000 ft. At lower levels, outputs in excess of unsupercharged sea level rating are possible.



This view illustrates the simplicity of a turbocharger installation on an existing Diesel engine.

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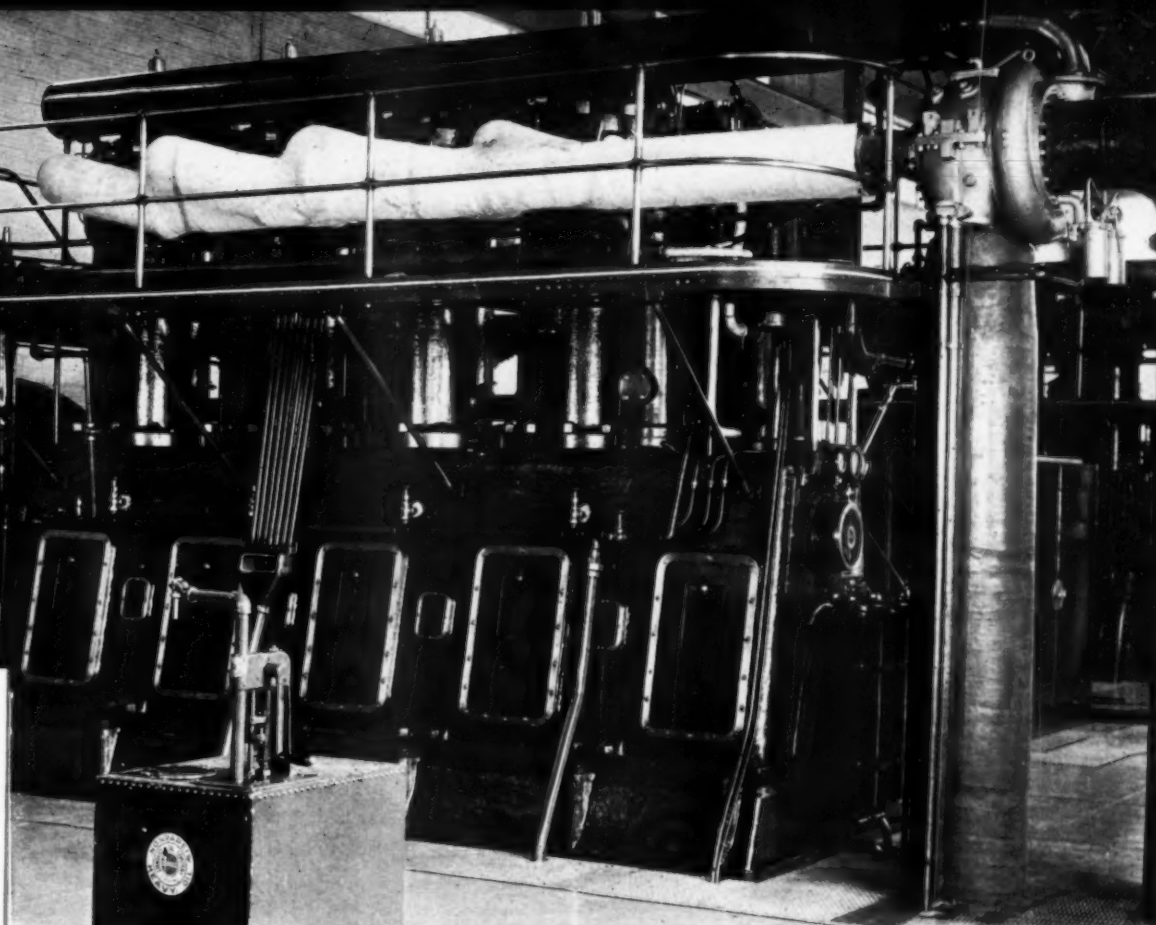
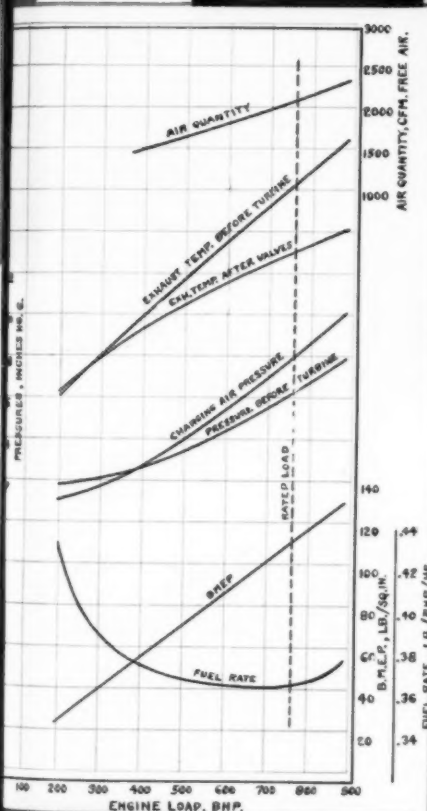
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The turbocharger installed on an existing Diesel in a pumping station of a major oil pipe line company increased the engine rating from 450 to 675 bhp. at 225 rpm.

3. When installed on an existing engine, the fuel consumption is charged very little over the original unsupercharged range of output. For the increased output range, however, the curve is very flat and the fuel consumption per bhp. per hour at the new turbocharged rating will be about the same or slightly less than at the original unsupercharged rating. This results in a considerable reduction in fuel consumption per bhp. per hour on a percentage load basis, referring to the new turbocharged rating as 100 per cent. The fuel consumption will be less at all loads with the Buchi system than with other supercharging methods.

4. Operation of the turbocharger is fully automatic at all loads, and no controls are required. Speed, air quantity, and charging pressure follow engine load and speed changes almost instantaneously, due to the low inertia of the turbocharger rotor. The engine is responsive to sudden load changes in the same manner as an unsupercharged engine. It starts easily and quickly under cold starting condi-

tions, and during start-up the turbocharger is accelerated by starting air before engine fires.

5. The turbocharger has no mechanical drive from the engine, being connected to it only through the air and exhaust gas manifolds. No belts, gears, or chains are required.

6. The turbocharger engine is ideally suited for direct reversing marine application, since the turbocharger always operates in the same direction regardless of engine rotation. As the turbocharger rotates from one to two minutes after shutdown of the engine, it may rotate continuously during maneuvering.

7. Experience has shown that the turbocharged engine is equally as reliable as the unsupercharged engine, and that no additional operating difficulties or maintenance costs are involved. Pistons, cylinder heads, and particularly exhaust valves, are often found to be in relatively better condition due to efficient scavenging. In spite of the increased output, it is generally possible to limit the maximum firing pressure to a very nominal increase, which may be allowed without harmful effects to the engine parts, due to smoother combustion. At the same . . . And now please turn to page 60 . . .



Front view of a com-
pletely assembled turbo-
charger.



Turbocharger rotor look-
ing into the inlet of the
blower impeller.

BEGINNING with the steamer *Calvert* in 1939, the Sound Steamship Lines has steadily Dieselized its fleet of passenger and freight boats. In 1941, it was the *Carisco's* turn to come in for complete conversion and now the *Pemaquid* is soon to appear as a modern motor-ship. While not of the same size, all three ships have had the same size of engine installed with the result that their speeds differ.

There is a very definite advantage, however, in having all installations alike in this particular fleet, for one crew is likely to find itself operating the *Calvert* today and the *Carisco* tomorrow, with the *Pemaquid* as an alternate at any time due to the nature of the services they are all equipped to maintain.

In years gone by, the *Carisco* has invariably operated a daily freight service between Pier 31, East River, New York, and Bridgeport, Conn. During the summer seasons, the *Calvert* has of late maintained the passenger and automobile ferry run between Orient Point, Long Island, and New London, Conn., while the *Pemaquid* operated a similar service between New London, Conn., and Block Island, Rhode Island. A fourth steamer, the *Naugatuck*, plied between Block Island and Providence, completing the criss-cross of Long Island Sound.

All this the war has changed and we are likely to see these well-known ships devoting their services to the war effort in place of the happy pursuits to which they have been accustomed in the past. Their modern Diesel engines, however, have given them a new lease on life and will stand them in good stead, come what may, from now on.

The three ships that have been converted compare as follows in dimensions and tonnage:

	<i>Calvert</i>	<i>Carisco</i>	<i>Pemaquid</i>
Length	180.0	180.1	132.5
Beam	40.0	28.4	28.0
Depth	10.3	12.5	9.8
Tons	545	843	409

The main propulsion unit in each ship is a six cylinder Atlas-Imperial four cycle, solid injection type, direct reversible Diesel engine directly connected to the propeller shaft. Each, with a cylinder bore of 15 in. and a piston stroke of 19 in., develops 600 shp. at 300 rpm. A Kingsbury thrust bearing forms an integral part of the unit, being inbuilt on the engine bed plate, and a single control lever centralizes all maneuvering action, starting, stopping, reversing and speed.

LONG ISLAND SOUND PACKETS CONVERTED

By DWIGHT ROBISON

Fresh water is used throughout to cool the cylinder jackets, etc. There is a shell and tube type heat exchanger through which the cooling water circulates before passing into an auxiliary fresh water tank of 300 gallons capacity. Here a double acting piston pump, driven by an eccentric on the engine crankshaft, picks up an ample amount of cooling water at any engine speed and in either direction of rotation while a reversible, centrifugal type sea water pump driven off the intermediate shaft feeds raw water through the tubes of the heat exchanger. The capacity of this system is ample to cool the engine even in tropical waters. A Weston electrical tachometer and an Alnor exhaust pyrometer instrument are mounted on a special engine panel board along with pressure gauges for fuel oil, lubricating oil and starting air. Inbuilt on the engine is a two stage air compressor having a displacement of 48 cubic feet per minute at rated engine speed and a Purolator duplex fuel filter is attached. Maxim spark arresting exhaust silencers are used for both main and auxiliary engines.

All three ships have two sources of electric power for the motor driven auxiliary equipment and, in addition thereto, a floating battery system. In the case of the *Calvert*, a 25 kw. 125/140 volt Star Electric d.c. generator is direct connected to a six cylinder Hercules Model DJXC—3¾ in. x 4½ in.—rated to develop 42 hp. at 1450 rpm. The *Carisco* has a three cylinder 6½ in. x 8 in. Model 153 Winton auxiliary Diesel engine direct connected to a 20 kw. 600 rpm. Ideal Electric 125 v. d.c. generator, and the *Pemaquid* a two cylinder 6½ in. x 8½ in. Model 2HS282 Atlas Imperial auxiliary Diesel direct connected to a 20 kw. 600 rpm. General Electric 125 v. d.c. generator. The *Calvert* and the *Carisco* have each a 25 kw. variable speed Star Electric 125/140 v. d.c.

generator driven by "V" belts off the intermediate shaft while the *Pemaquid's* shaft driven generator is of 20 kw. capacity.

In the case of the *Calvert* and the *Pemaquid*, there is an Exide type MVA, 17 plate storage battery containing 56 cells at 112 volts each having a capacity of 274 ampere hours at the eight hour discharge rate. The *Carisco* battery is a Titan lead battery consisting of 60 cells at 120 volts having a capacity of 300 amp. hrs. The two generators and the battery are in each case controlled by a single switchboard with a double throw switch. Generator voltage and lamp voltage regulators maintain automatically the proper voltage for any service required. Fire pumps, bilge pumps, sanitary pumps, and ship's fresh water supply pumps are all motor driven as is the auxiliary two stage air cooled air compressor available to supplement the built-in compressor on the main engine. This auxiliary air compressor has a capacity of 36 cu. ft. per minute at a working pressure of 250 lbs. Four 30 in. x 96 in. air receivers in each ship have ample capacity for starting and maneuvering purposes and the air horn.

... Now please turn to page 67 ...



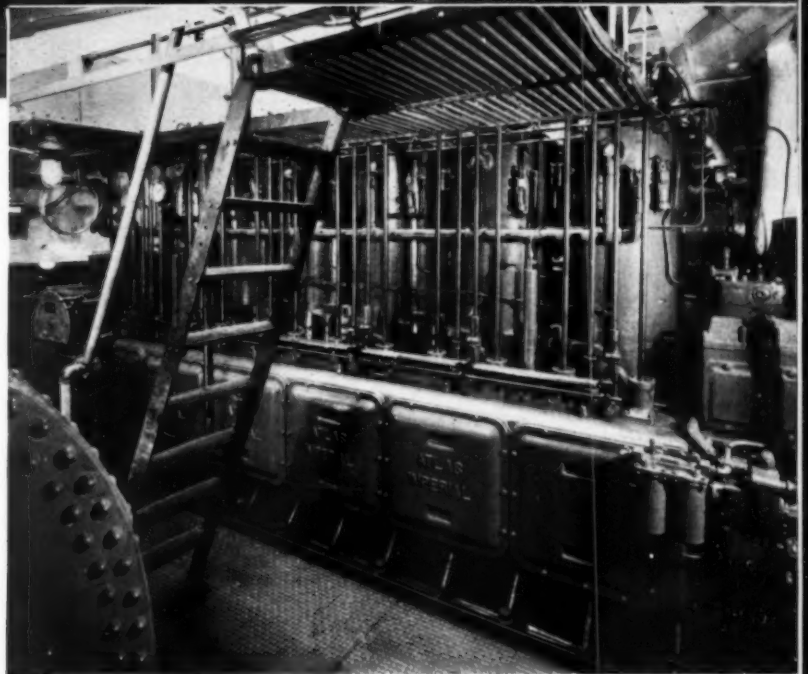
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↑ The Long Island Sound packet "Calvert" converted to Diesel propulsion last year.

Engine room view on the "Calvert" showing the Atlas 600 hp., 300 rpm. main Diesel. This installation is typical of conversions on the three packets. Note Purolator duplex fuel filter. →



The Long Island Sound packet "Pemaquid" now undergoing conversion with an Atlas Diesel.



↑ Engine room view on the "Carisco" showing the Atlas 6 cylinder, 600 hp., 15" x 19" main Diesel.
← The converted packet "Carisco."





DIESEL LOCOMOTIVES

SAVE TIME AND MONEY

Basic Refractories, Inc., formerly the Basic Dolomite Company, Maple Grove, Ohio, a large manufacturer of road sand, road gravel, and agricultural limestone, operates a General Electric 45-ton locomotive powered with two Cummins Diesels fitted with De Luxe filters, Perfex radiators, driving General Electric 50 kw. generators. This locomotive, shown above, operates twenty-four hours per day on general switch yard work, actual working time—eighteen to twenty-one hours per twenty-four hours, using approximately twenty-five gallons of fuel per eight hours.

In this view, the same locomotive, shown above, is hauling a string of cars loaded with burned limestone from the burning plant to the stock pile.





Republic Steel Company, Warren, Ohio, operates this General Electric 80-ton, 500 hp. locomotive, powered with two Cummins Diesel engines, for general yard switching. Mr. C. G. Russell, chief clerk to the superintendent of transportation, said, "Compared with steam, the Diesel will handle one-third more tonnage at one-third the cost of steam. Use of Diesel eliminates need of a fireman. The Diesel is quicker. We save one-third of the time in switching. This is an engine! Both Diesels use five gallons of fuel per hour. No limit to hauls. Has handled 31 buggies and two ladles."

Another view of the locomotive shown above. Here the unit is hauling scrap buggies over the trestle which bridges the scrap yard. Two buggies, empty, weigh 51,000 lbs. The load varies. The heavy train is hauled up a ramp of twelve to fifteen per cent grade, each trip.





DIESEL CLEARS THE LAND

Daddy of modern tanks, this Diesel tractor and Angledozer fells sizable trees.

From May to November—Removes Snow All Winter

THINGS seemed a bit gloomy for two young men in Bagley, Minnesota back in the spring of 1938. Jobs were scarce and, like many others, these chaps were unemployed. But both lads were observant . . . and therein lies the story of the youthful firm of Christensen and Waggoner of Bagley, Minnesota. Having noted that the hand labor methods employed by settlers in clearing the wild cutover country around Clearwater, Minnesota were most tedious, the unemployed pair came to a momentous decision. They staked their future on the belief that a good living was to be made in land clearing through modernized methods.

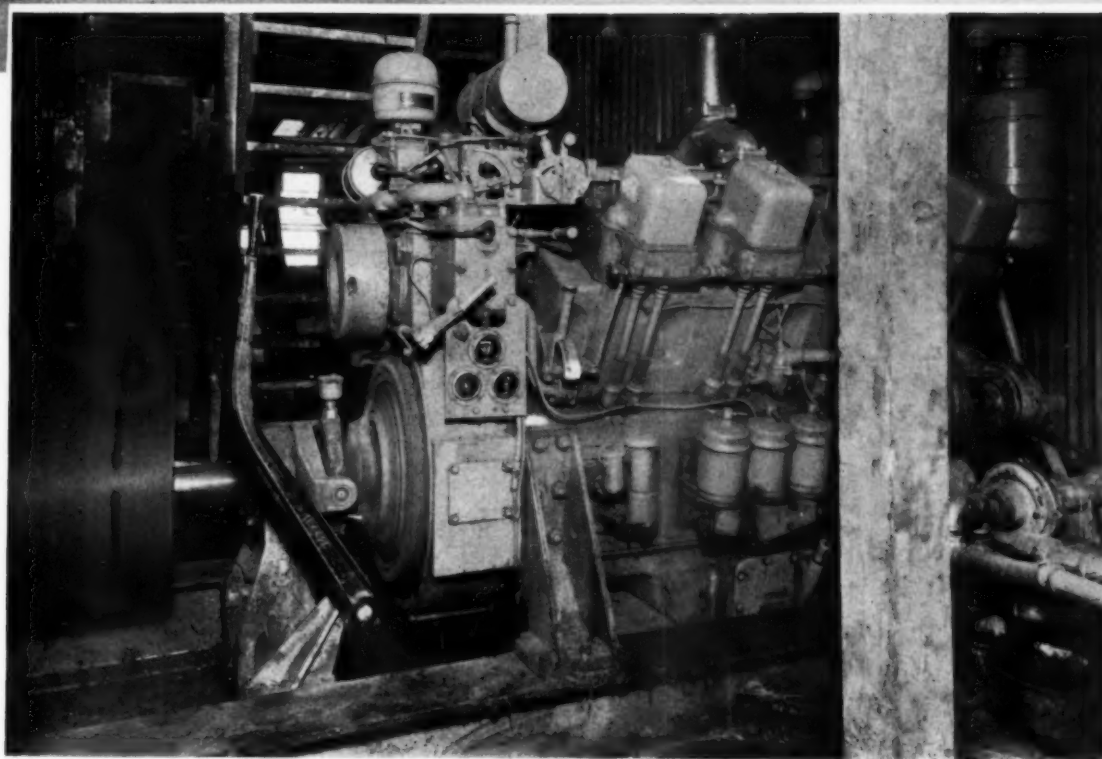
So a Diesel Tractor equipped with an angle-dozer was purchased and the two young men "hung out their shingle." That was more than three years ago. Today they own their equipment and have practically a virgin field in which to work, for Clearwater County has about 200,000 acres of cutover land awaiting the plow. Christensen and Waggoner charge \$5 for clearing and \$8 an hour for breaking. They remove trees from ten to 15 inches in diameter and cut a furrow eighteen inches deep. Working a sixteen-hour day, they manage approximately eighteen acres of clearing and breaking, or about an acre per hour. Usually they work on

an average of five days a week, with the sixth day taken up in moving to new work and with other miscellaneous matters. Their season begins in late May and continues until the last part of November. But, during the winter months, this enterprising team isn't idle. Christensen and Waggoner are employed by Clearwater County, and various townships, to remove snow with their handy equipment.

The partners are well satisfied with their Caterpillar Diesel tractor and plan additional purchases later. They state that the tractor operates on $3\frac{1}{2}$ gallons of $9\frac{1}{2}$ -cent fuel per hour.

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Picacho Gin Company, Eloy, Arizona, where twenty-four 550 lb. bales of long staple cotton are ginned in a 12 hour day.

Caterpillar Diesel D17000 driving a twenty stand cotton gin, two 5 ft. cleaners, bale press, seed sterilizer, and suction fan to unload wagons.

LONG staple cotton, which plays an important part in the manufacture of tires and airplane fabric, is ginned by the Picacho Gin Co. of Eloy, Arizona, using a Diesel prime motor. Located nine miles south of Eloy, this new Bima gin is being operated for the second season by a Caterpillar Diesel engine which was installed in August, 1940.

The Diesel runs twenty roller stands, two five foot cleaners, bale press, seed sterilizer and a suction fan that unloads the wagons. Twenty-four 550-pound bales were being produced every twelve hours in January, with plans calling for a step-up to twenty-four-hour production due to a goal of 2,500 bales.

The engine operates in a dusty, linty atmosphere, but no difficulty is encountered. According to the company officials, the engine has plenty of power to run all the machinery, and since the engine was installed it has never missed a lick. Its operating cost, officials say, is considerably less than would be the cost of operation on purchased power.

The long staple cotton requires special ginning equipment and must be handled very carefully so that the staples will not be broken. The Picacho Gin Co. has 6,000 acres of this long staple cotton planted this year. It uses its gin exclusively for the cotton grown by the company.

13000 POUNDS OF COTTON A DAY

By GEORGE D. CROSSLEY

NEW FILTRATION MATERIAL AFFORDS GREATER PROTECTION FOR DIESELS



AN exclusively-prepared, high efficiency filtration material, which completely removes carbon, dirt, and grit from oil without affecting oil additives, has been announced by Briggs Clarifier Company, Washington, D. C., manufacturers of oil clarifiers. This new product, announced after years of research and development, is manufactured specifically for oil filtration alone. Importantly, it is placed on the market at a time when it is imperative—as never before—to protect engines to the utmost.

The new material is a long-fibered cellulose, obtained from wood in such a way the length of the fiber is not materially shortened, nor the waterproof elements removed. History of the development is noteworthy. It started when, years ago, Briggs engineers decided that the efficiency of filtration was dependent upon the properties of the absorbent filtering material. So far, all commercially-used filtering materials were made primarily for purposes other than that of oil filtering.

It was, therefore, decided to institute a basic research project, aimed at discovering the principles involved in oil filtration and the basic materials which would best suit oil filtration requirements. After investigating the basic

Cutaway view of the new type oil filter refill showing its construction. Note that between the perforated center tube and the outside wire screen are wrapped the sheets of cellulose material to the desired thickness.

fibers, it was found the best material was a specially processed fiber.

Further experimentation and field testing proved that this fiber could be controlled in the manufacturing process so that the porosity of the material would give the maximum flow rate possible with the minimum amount of dirt being allowed to pass through. A manufacturer was licensed to make the material exclusively.

As the material is utilized only for oil filtering, all its properties are designed for efficiency of oil filtration, and are not influenced by the need of adjusting the product to fit the characteristics of any other liquid.

Development of the material might very aptly be termed, "From Tree to Clarifier," because the material started as a vigorous, flourishing tree, and had some pretty expert handling before actually filtering oil.

To obtain the fiber from the tree, a specific machine was found which did two important things well; it mechanically separated the fibers in the wood without decreasing their length, and left unaffected the lignin coating of the fiber which makes it inherently waterproof.

After obtaining the fiber, it is pressed into sheets by special, heavy rollers. Every sheet is thoroughly tested for porosity. It is then cut into desired lengths and made into a refill.

The refill is composed of a center metal tube, perforated to control the flow of oil. Inside the tube is a supporting spring. Outside the tube is a cotton sock which, against the tube, acts as a final-stage screen. Around the tube is wrapped the cellulose material to the desired thickness. The cellulose is covered on top and bottom by the cotton sock. A wire screen surrounds the cellulose to strengthen the refill and facilitate handling. A wire handle makes changing refills easy. Features of the cellulose fiber include its adaptability to any size, type or make of Diesel engine. Each clarifier is a complete unit in itself, engineered to meet the individual requirements of the customer. It is easily installed, and works automatically.

GETTING MORE OUT OF YOUR PRESENT EQUIPMENT

BY R. L. GREGORY*

THE above subject is one which every engineer connected with power generation should be interested in. If for no other reason than his sense of patriotic duty and loyalty to his country, he should be willing to go out of his way in his efforts to obtain as efficient operation of the equipment under his control as is humanly possible to acquire. We are all in this titanic struggle up to the hilt, or should be, and if it is our allotment to keep our Diesels rolling in order that those in the front line can keep routing the enemy, we must sacrifice hours and effort in our particular jobs in order to produce results.

We all recognize the fact that prime movers have their limitations, whether Diesel, steam, gas or hydro. But, due to design and characteristics, these limitations on internal combustion units are much narrower than in some other types of prime movers. In our attempts, therefore, to obtain more power from our Diesel units, it is necessary that we understand these limitations fully, as well as to recognize those conditions which we can improve. In other words, there is such a thing as overdoing the matter and our efforts must strike the happy medium.

The actual capacity of the average Diesel is limited to approximately ten per cent above rated capacity. This is not true of all units, since some will exceed this figure. And I do not mean to state that Diesels cannot be operated above actual capacity. They can for short periods of time, provided such operation does not have detrimental effects upon the mechanical condition of your engine. Peak system loads often demand operating your Diesels for short intervals at a point above actual capacity, but when you do so, you are not obtaining the most efficient results. This point, however, must be sacrificed in such instances.

The actual capacity of a Diesel depends upon

* Chief Engineer, Municipal Water and Light Plant, Hillsdale, Michigan.

several factors: elevation, atmospheric temperatures, barometric pressures, temperature of the cooling agent, fuel conditions, and, last but not least, the mechanical condition of the units. Granting that you have good grades of fuel and lubricants, that local conditions and the mechanical condition of the unit are good, it is safe to say that the actual capacity of the unit is reached when the load can be handled with the slightest trace of a haze in the exhaust. By this I do not mean a smoke in the exhaust. Some engineers desire to operate with a completely clear exhaust, but there are many kilowatts available between the point of clear exhaust and a point where a very slight haze is noticeable.

The rated capacity of a unit depends upon the mean effective pressure and proper combustion conditions. We have been asked frequently by engineers why they could not increase the speed of the unit and obtain more output. This can be done under certain conditions. Where you have isolated units, or units operating not in synchronism with other units, a certain amount of speed increase can be made. But it is well to consult with the manufacturer before doing so, since any increase in speed puts additional stress on the moving parts of your engine, and the manufacturer can advise you the allowable increase, knowing what these additional stresses will be.


As stated in several previous articles in this section, the best way to get all you can out of your unit is to keep it well maintained. Maintenance means a lot these days, and especially if you are handicapped by limited generating facilities, thus limiting your outage for maintenance. We should take advantage of every available outage opportunity to inspect vital parts of the units.

There has been considerable discussion of late in the various Trade Journals on the subject of obtaining more output by the use of Superchargers. Superchargers will increase the

output above the actual capacity. But here, too, you will have limitations. Supercharging means forcing more air into the cylinders which allows the burning of additional fuel. This, too, means that more heat will be generated by combustion which has been increased and consequently more waste heat passes into the exhaust. It also means a rise of mean effective pressure, but this can be compensated for by lowering your compression and thus hold your cylinder pressures within proper range.

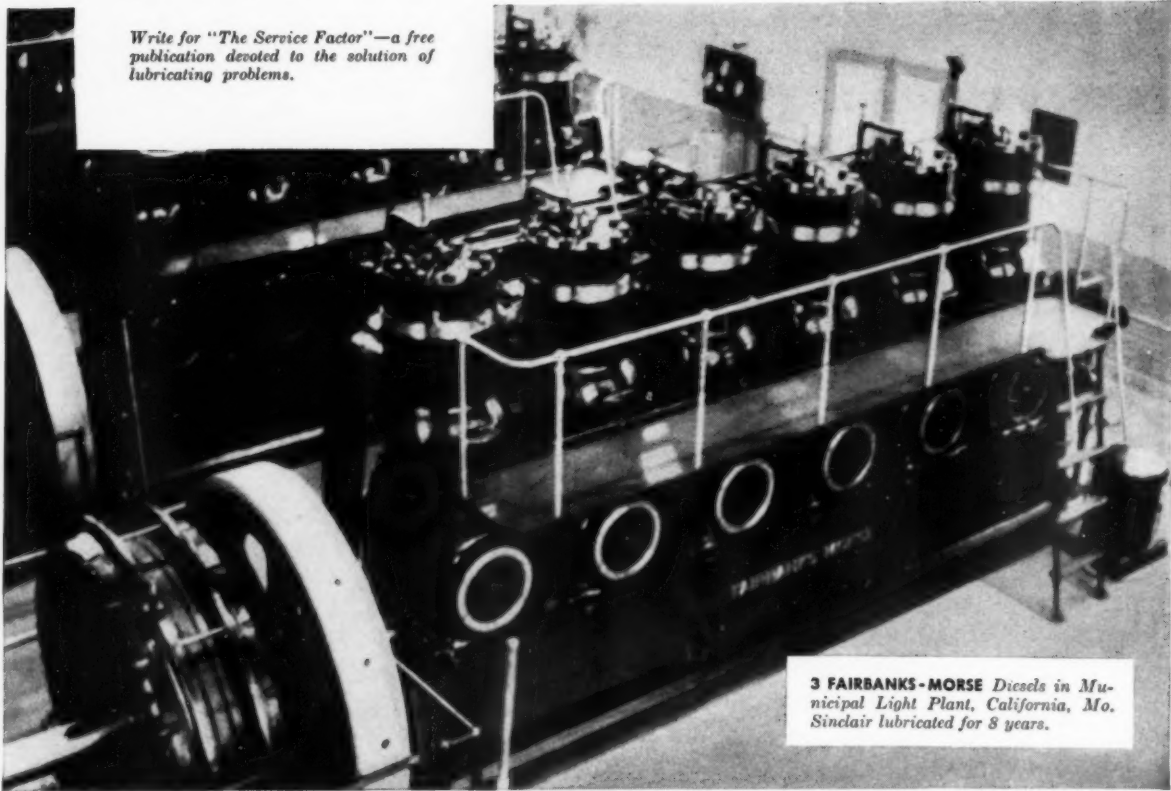
Another point that must enter into the picture, where superchargers are used, is the temperature of your cooling agent. I have in mind a certain plant where the source of cooling water was a river. During the summer months, this river often became quite low and the flow became sluggish with the result that the water often approached 80 degrees in temperature. Since it was impossible to get proper cooling conditions on the engine with water at this temperature even before supercharging with near rated load, the supercharging did not help in the summer months until they added a cooling tower and changed the source of cooling water to deep wells. When this was done, the supercharging gave them about twenty per cent increased capacity.

Another point which is brought up by supercharging is that of fuel pumps and equipment. Since you will burn more fuel, your pumps, nozzles, and other contributing equipment may need changing and, consequently, the manufacturer should be consulted on these points. There have been so many changes in design of various parts by the manufacturers of Diesel equipment, particularly within the last couple of years, that they can often make suggestions to you which will materially increase your output and efficiency, if these suggestions are adopted. And since all Diesel manufacturers are literally swamped with their own problems, it is up to the average engineer and supervisor to occasionally consult the manufacturer con- . . . And now please turn to page 70 . . .



FRONT LINE MIGHT
rests on rear line power.
DIESEL ENGINES deliver
full designed horsepower
when lubricated with . . .

**.....SINCLAIR
RUBILENE OILS.**
These sludge-resistant oils
have lasting lubricating film
that keeps ring and liner wear
negligible in sustained heavy
duty operation.



Write for "The Service Factor"—a free
publication devoted to the solution of
lubricating problems.

3 FAIRBANKS-MORSE Diesels in Mu-
nicipal Light Plant, California, Mo.
Sinclair lubricated for 8 years.

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Victor's wide range of Gaskets, Oil Seals and Grease Retainers, developed in peacetime, are now meeting the exacting requirements of wartime. Victor Manufacturing & Gasket Co., P. O. Box 1333, Chicago, Ill., U. S. A.

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WHAT DO *YOU* LOOK FOR IN A POWER TAKE-OFF

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Then read the record Twin Disc Power Take-offs have established under actual field conditions, in the most rigorous of all oil field applications . . . drilling. In this twenty-four hour a day job, Twin Disc Power Take-offs have proved themselves so superior that over 90% of all engines in this service are equipped with Twin Disc Power Take-offs.

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The Twin Disc line is complete. It meets the full range of S.A.E. flywheel housings. At the Twin Disc plant a perpetual inventory, based on the number of clutches in actual operation, is maintained. This reservoir of parts is brought next door to you through three factory branches and parts depots in the active fields.

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Twin Disc Power Take-offs aren't built to fit just any engine, but the specific engine you want to team them with. As a result, long life and trouble-free operation are assured by the specialized engineering and design inherent in this policy.

An invitation to engineers and executives.

Twin Disc is the recognized headquarters for Power Take-off problems. By directing yours here, you can't help but ease your maintenance and operations burdens . . . and the chances are you'll also achieve new operating efficiency, new economy, and increased production capacity at lower costs. Just address the TWIN DISC CLUTCH COMPANY, Racine, Wisconsin.

BELOW: Twin Disc Power Take-off for engines having up to 285 hp. output. Sizes: with single plate clutches, 6½" to 24"; double plate, 11½" to 18". Housing sizes: No. 6 S.A.E. to No. 00 S.A.E.



TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U. S. PAT. OFF.

Supercharging Four Cycle Diesel Engines

Continued from page 49 . . . time, such an increase has a very slight effect on the average bearing loading. Bearings designed for satisfactory unsupercharged operation have proved equally reliable after the engine was converted to Buchi turbocharging.

8. At reduced speeds down to 50 per cent or less, engine torque can be maintained constant—and in some cases actually increased—without exceeding established temperature limits.

9. Exhaust pulsations are dampened considerably in passing through the turbine. Exhaust mufflers for the turbocharged engine can, therefore, be simpler than for other types of engine. For marine application, it is generally considered entirely satisfactory to use a simple form of combination spark arrestor and muffler.

10. Relatively less heat is absorbed in the engine jacket cooling water, since a greater percentage of heat is absorbed by the scavenging air and goes into the exhaust gas, some of which is usefully employed in the turbine. It is generally found that the heat exchanger originally installed for the unsupercharged engine will suffice for the turbocharged engine with higher rating.

The chart on page 49 shows turbocharged performance of a six-cylinder, 13¼ in. x 17½ in. engine of conventional design, originally rated 500 bhp. at 360 rpm., and increased by turbocharging to 750 bhp. at 360 rpm. This type of engine is one which could be turbocharged successfully in the field with a moderate amount of modifications. Note the flatness of the fuel consumption curve, and the reasonably low exhaust temperatures.

In considering the application of a turbocharger to an engine, the first question to be decided is whether or not the power increase can be utilized effectively by the driven machine. With Diesel generating units, a larger generator would be required providing an oversize generator was not installed originally in anticipation of such a step. With existing generators now operating at less than unity power factor, another possibility is to increase the power factor and thus absorb additional load without major changes. With engines driving pumps, the load increase can sometimes be absorbed by increasing the speed, when the engine and the pump designs permit, or changing the gear ratio and increasing the pump speed only, in the case of geared units.

With direct propeller speeded u

The such requires neering fa years of n ence. The attaching piping up ditions. H ice by ex available i pective use

Because of ing, and s required w the custom application manufactur quires new manifolds, fold, a mo and cooling in applying new fuel pu jection timi cases, new the cylinder sary. In ev design is s adaptability plication is

Installation charger on t difficult prob rugged and assembled an taken to pre dirt while h expected with ating attention an uninterupt oil under mo culation of co casing also i gency, the en turbocharger original unsup

The turbochar bracket attache rotor axis para rangement per exhaust manifo sion joints are in the exhaust

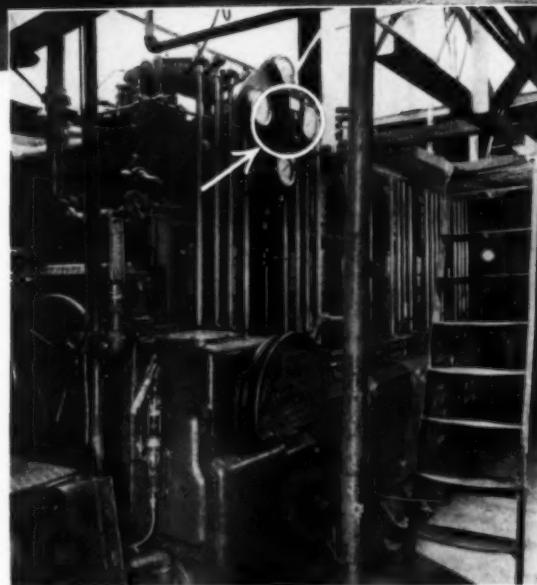
With direct-propulsion marine engines, a larger propeller could be installed, or the engine speeded up, if it is suitable for higher speed.

The successful application of the Buchi system requires careful consideration of several engineering factors which are well established from years of research and field operating experience. The problem is not so simple as merely attaching a turbocharger to an engine and piping up the exhaust gas and inlet air conditions. However, a technical engineering service by experienced Buchi representatives is available in this country to assist the prospective user with these problems.

Because of the necessity for careful engineering, and since certain new engine parts are required when the turbocharger is installed, the customary practice is to have such an application sponsored by the original engine manufacturer. The altered valve timing requires new cams or camshafts. New exhaust manifolds, connections to the air intake manifold, a mounting bracket, expansion joints, and cooling water connections are required in applying the turbocharger. In some cases, new fuel pump plungers and alteration of injection timing are recommended. In other cases, new valves and slight modifications to the cylinder head or piston crown are necessary. In every instance, the original engine design is studied carefully to ascertain its adaptability to turbocharging, before the application is undertaken.

Installation and operation of the turbocharger on the engine involve no particularly difficult problems. The turbocharger itself is a rugged and relatively simple machine. When assembled and installed properly, with care taken to prevent damage and admission of dirt while handling, reliable service can be expected with only a normal amount of operating attention. The principal requirement is an uninterrupted supply of clean lubricating oil under moderate pressure. Continuous circulation of cooling water through the turbine casing also is essential. In cases of emergency, the engine may be operated with the turbocharger inoperative, and nearly the original unsupercharged bmep. rating carried.

The turbocharger is usually supported by a bracket attached to the engine frame, with the rotor axis parallel to the crankshaft. This arrangement permits the shortest and straightest exhaust manifolds to the turbine inlet. Expansion joints are used at appropriate locations in the exhaust manifolds to the turbine, and



The "Carisco", above, is one of three familiar Long Island Sound packets that have been converted to Diesels, each protected by "Alnor". Her engine room with Alnor installation is shown at right. →

Conversion to Diesel Means "Alnor" Protection — Of Course

Three well-known Sound Steamship Lines packets, the "Calvert," "Carisco" and "Pemaquid" are now plying between New York and Long Island Sound ports under Diesel propulsion after years of service as steamers. Identical Atlas Imperial, six cylinder, 600 hp. Diesels are installed in each Vessel—each equipped with an "Alnor" exhaust pyrometer. Each ship saves \$1500 a month since conversion to Diesel. No wonder their owners want to protect these money-making power plants with dependable "Alnors."

Buy or specify "Alnor"
Ask for catalog



Illinois Testing Laboratories Inc.

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in the exhaust pipe from the turbine, to compensate for expansion and contraction with temperature changes, and to relieve the unit of piping strains. The exhaust manifolds may be insulated in several different ways to minimize heat radiation direct to the engine room. Intake air to the blower is generally taken directly from the engine room, in which case a silencer is attached to the blower inlet. In other instances, air is conducted to the unit by means of piping from an external source, providing

means of incorporating an intake filter in the induction system where the air contains dust, excessive oil vapors, or other bad impurities. Cooling water lines to and from the turbine casing water jacket, and the lubricating oil cooler, are connected to the engine cooling system. Soft water cooling is recommended. An Elliott-Buchi turbocharger installed on a four cylinder, 16¼ in. x 24 in. engine in a pumping station of one of the major pipe line companies pumping oil from mid-continent

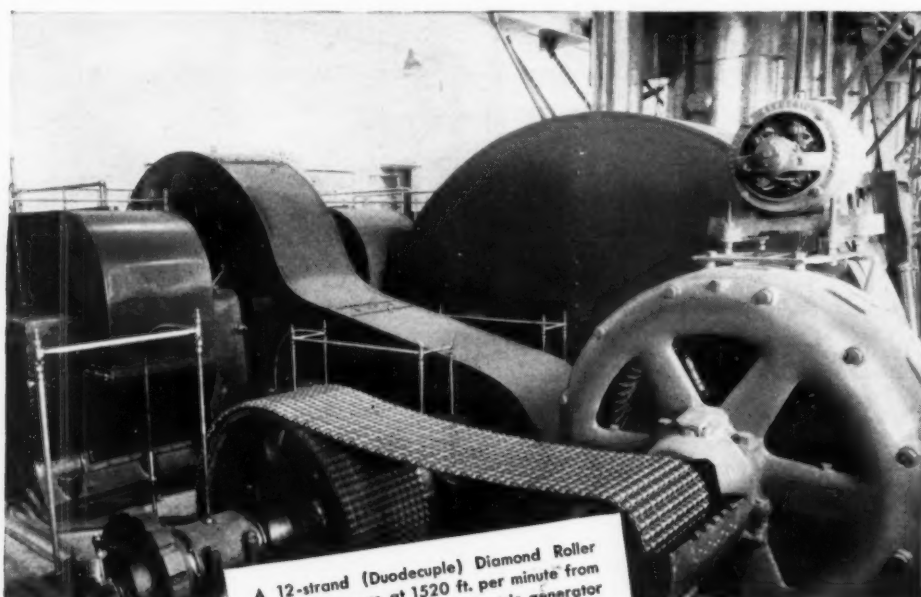
fields to refineries in Chicago and St. Louis districts, is shown herewith. The engine rating was increased from 450 to 675 bhp. at 225 rpm. The load increase in this case was absorbed by increasing the speed of the driven oil pump.

Several sizes of turbochargers are standardized, and in production, which can be applied to engines with present unsupercharged ratings from about 250 bhp. to approximately 1100 or 1200 bhp. With an engine of higher rating, it is sometimes practical to install two turbochargers, one on either end. Each size is adaptable to a range of engine ratings, by variation in dimensions of a few internal parts. The design is flexible in permitting different mounting and piping arrangements, for various makes of engines and number of cylinders. The design and manufacture of the turbocharger are according to the most advanced practices, incorporating materials best suited to the operating requirements. All parts are made to close tolerances, with wearing parts interchangeable without hand fitting.

The turbine casing is an alloyed semi-steel casting, which is water jacketed. The turbine inlet is a steel casting containing either two, three, or four openings, depending on the number of engine cylinders. These openings are attached directly to the engine exhaust gas manifolds through expansion joints. The nozzle ring is made of heat-resisting materials, to avoid distortion under operating temperatures. The blower casing is a high-grade iron casting and is bolted to the turbine casing. The blower casing also carries the cantilever type bearing support, which supports the rotor from the blower and without the need for a water-cooled bearing at the high-temperature turbine end.

The turbine disc and blades are machined all over from a high-strength, heat-resisting alloy. In the rotor assembly the blower impeller is of the closed type, and is inspected by radiograph as well as overspeeded before assembly. The complete rotor is balanced statically and dynamically to close limits.

The rotor is supported by steel-backed, babbitt-lined sleeve bearings, which are lubricated by oil under pressure. The bearing journals are superfinished. A separate self-contained lubricating system is usually furnished, in order that lubrication of the turbocharger will be independent of engine lubrication. This system includes a gear pump driven from the shaft through a reduction gear, an oil tank, oil



A 12-strand (Duodecuple) Diamond Roller Chain Drive runs at 1520 ft. per minute from 500 H.P. Diesel engine to electric generator in pipe-line station.

RELIABILITY for Long Uninterrupted Service

The Diesel generator drive illustrated not only provides the steady, smooth transfer of power without slip or creep, but eliminates the usual periodic taking up for stretch, and the delays and expense of replacements.

Rugged and compact, Diamond Roller Chain Drives comprise a power transmission of anti-friction roller bearings. They hold to 98-99% efficiency, transfer power equally well over short or long center distances—and reduce strains and wear on bearings since one side runs slack. Temperature variations, moisture, dust or sudden variations of load do

not affect the performance of Diamond Drives.

While ideal for generator and machinery drives, Diamond Roller Chains are widely used also as high speed engine timing and auxiliary drives,—on drives from a fraction of a horsepower to 1500.

Made in pitch sizes from ¼ in. up to 2½ in., in single and multiple widths to 16 strands, Diamond Roller Chains insure reliability of power transmission for long uninterrupted service. DIAMOND CHAIN & MFG. CO., 407 Kentucky Ave., Indianapolis, Indiana. Offices and Distributors in Principal Cities.

DIAMOND



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cooler, and filter. In some installations, lubrication is being provided successfully from the engine pressure-lubricating system, in which case a separate twin filter element is furnished for the turbocharger oil supply.

Some readers undoubtedly will be curious about the cost of making such an installation on an existing engine. Due to the many variable factors involved, it is not possible to give a precise figure until all of the factors are known, and it will be found that the cost will vary somewhat, depending on individual circumstances. A rather liberal estimate, however, would be approximately \$30 to \$40 per horsepower increase in output, including the engineering cost, turbocharger, manifolds, new engine parts, and installation on the first engine. Repeat applications on identical engines would result in reduced unit cost, since certain elements making up the total cost of the first installation would be reduced or eliminated. (It should be noted that the cost of turbocharger installations on new engines is very materially less than the above figures.)

Another question the prospective user might ask is "Can turbochargers be procured under present war production requirements, assuming that it will help my particular power generation problem?" The answer to this question is simply the same as for other critical machinery being used in the war effort—you can obtain delivery of turbochargers if your preference rating is high enough. If your problem is of sufficient importance to warrant a high priority, therefore, turbochargers can be delivered usually in less time than it would take to secure new engines.

Frank M. Boylan Joins Buda Co.

MR. FRANK M. BOYLAN has just joined The Buda Company, Harvey, Illinois, manufacturers of Diesel and gasoline engines, railway equipment and lifting jacks, as a field representative in the Industrial Division handling railroad products and lifting jacks. Mr. Boylan before joining the Buda Company was on the sales force for ten years of the Nester-Johnson Manufacturing Company of Chicago; two years with the Firestone Rubber Company, West Virginia; and eight years with the Ingersoll Watch Company. He attended the University of Rochester, New York, and served eighteen months in France during the last war.

Enterprise Diesel Appoints Young Advertising Agency

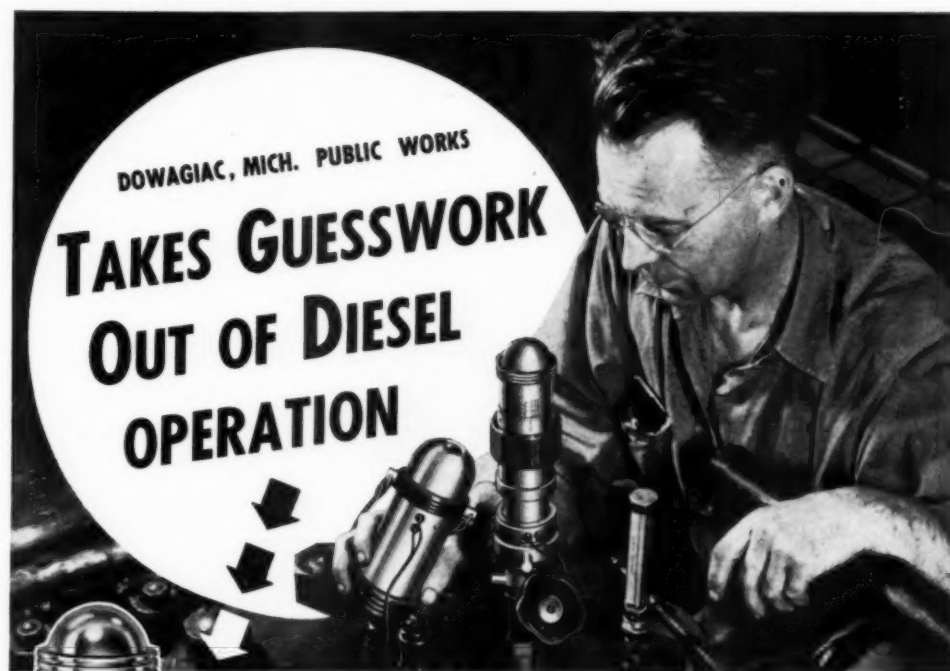
ENTERPRISE Engine and Foundry Co., San Francisco, announces through Vice-President C.

G. Cox the appointment of Robt. B. Young Advertising Agency to direct the firm's advertising. Currently, a national campaign in business publications is in preparation on Enterprise Turbo-Supercharged Marine Diesel Engines. Later, campaigns will be developed for the company's Oil Burner and Process Machinery Divisions.

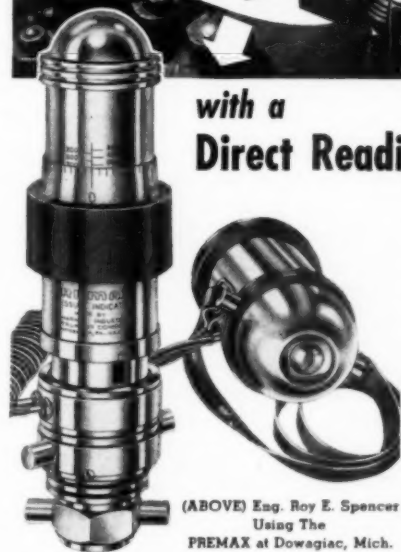
The Enterprise Company is the largest builder of Diesel engines in the West with a note-

worthy leadership dating back to 1856. For the past quarter century Enterprise has directed its engineering initiative and energy to the development of Turbo-Supercharged Diesels with achievement now evidenced by Enterprise equipped ships—either direct propulsion or auxiliary power—sailing the seven seas. The company is now building its engines for the Army, Navy and Maritime Commission.

Enterprise is headed by Charles Hoehn, Presi-



with a Direct Reading *Premax* INDICATOR



(ABOVE) Eng. Roy E. Spencer Using The PREMEX at Dowagiac, Mich.

The direct-reading PREMEX Pressure Indicator is a simplified precision-testing instrument that is ideally suited for operating men. It is rugged, fool-proof, dependable — requires no skill, scale measurements, or calculations. The PREMEX is easily attachable to all Diesel engines including the latest automotive types.



BACHARACH INDUSTRIAL INSTRUMENT CO.
7000 BENNETT STREET • PITTSBURGH, PA.

The Superintendent at Dowagiac reports that using the PREMEX Indicator to check compression and firing pressures has made it easy to keep Dowagiac's four Fairbanks-Morse Diesels in proper adjustment. Guesswork has been eliminated; efficient operation, economical fuel consumption, and maximum KW output have been assured. The saving in time and labor is alone considered great enough to justify the purchase of the PREMEX Indicator.

Checking compression and firing pressures regularly with the PREMEX assures maximum Diesel performance — for maintenance of proper pressures is the best protection against damage to precision parts, wasteful fuel consumption, loss of power, sluggish acceleration, smoky exhaust and starting difficulties. Case studies prove that the PREMEX usually pays for itself through savings effected. Write for Bulletin 283 which gives full particulars.

SEND ME PREMEX BULLETIN 283

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Address

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We Operate

No. Cylinders Make of Engine
H.P. H.P.M.

dent; C. M. Sayre, C. S. Herbert and C. G. Cox, Vice Presidents, and R. Hundley, Chief Engineer. The main offices and plant are located in San Francisco with other plants in Richmond and South San Francisco. Offices are in Washington, D. C., Seattle, and New York.

The Robt. B. Young Advertising Agency was originally established in 1921 and is a member of the Affiliated Advertising Agencies Network, an agency group with offices in the principal cities of the United States.

Improving Diesel Performance

EDITOR'S NOTE:—The following discussion of Diesel fuel oil conditioning should prove interesting and helpful to Diesel operating engineers. We offer this material in the interest of getting the most out of existing Diesel installations for the duration.

TODAY the facilities of oil refiners and Diesel equipment makers are taxed to the limit of their production. Delivery of a uniform fuel oil supply is becoming less dependable, replacement of parts more and more difficult.

Under the circumstances, several important factors should be given consideration in order to obtain peak efficiency with minimum outage in the operation of a Diesel plant:

Water conditioning to prevent precipitation of solids in the cooling water from accumulating and clogging water passages—also the prevention of rust formation. The benefits derived in the use of a proper water conditioning treatment need no comment.

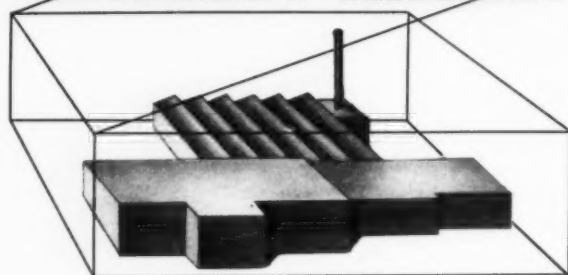
Air conditioning to filter the air for combustion plus keeping the air at the desired uniform temperature and humidity. The use of conditioned air, requiring air conditioning equipment, has proved economical in external combustion applications. When conditions return to normal for the purchase of new equipment, air conditioning may prove profitable for the Diesel plant. The air used for supplying oxygen for combustion contains a percentage of moisture and foreign substances, such as dirt and dust particles, in addition to inert nitrogen. Since about fourteen pounds of air are required to burn one pound of fuel oil, the desirability of air conditioning becomes apparent.

Diesel Fuel Oil Conditioning to purify chemically the fuel oil—inhibit against fuel oil contamination, and aid combustion for smoother operation. Fuel oil conditioning has been used for years as an additive to all grades of fuel oil (No. 1, No. 2 up to No. 6 Bunker C) burned in industrial furnaces and under heating boilers. Conditioning of gasoline has also proved highly successful in improving the operation of gasoline engines. Fuel oil conditioning by chemical purification counteracts the fouling tendencies of a fuel oil which cause physical and chemical changes. These changes are probably due to condensation, polymerization, oxidation, adsorption and decomposition. Fouling tendencies of fuel oil also increase in storage, handling and transportation after leaving the refinery. Upon refilling the storage tank, the newly delivered Diesel oil may become contaminated by the oil remaining in the tank. Oil conditioning will aid in supplying a clean uniform fuel oil to the atomizer, and in addition will aid oil straining and centrifuging.

Fuel Oil Conditioning also inhibits the system against contamination by dispersion of the water and sediment, and prevents excess accumulation of foreign matter in the oil storage tank.

Fuel Oil Conditioning aids combustion and effects easier starting and smoother operation.

PUT THE LID ON EXHAUST RACKET



WITH MAXIM SILENCERS

Engine exhausts, particularly under the present conditions of continuous operation, set up a racket that raises havoc with work hour concentration and the hours of sleep.

But there's a lid that can be put on that racket . . . a "lid" made by Maxim.

Maxim Silencers, known the world over, are effectively reducing such noises to a whisper, when installed directly on Diesel exhaust lines. The principle is sound, the construction rugged, and you buy years of perfect, uninterrupted service, with

practically no maintenance, when you specify Maxims.

Whether your problem of silencing concerns Industrial or Marine Diesels, there's a correct Maxim for each condition. And in addition a spark arresting feature can be had that will positively trap all escaping embers.

Ask Maxim engineers for recommendations . . . for straight silencing, for the added spark arrestor, or for a Maxim Waste Heat Boiler combination.

. . . and BUY MORE WAR BONDS

THE MAXIM SILENCER COMPANY

94 Homestead Ave.

Hartford, Conn.

especially noticeable at load changes. Due to the present great demand for a high yield of more volatile gasoline from crude oil, the distillate and residual fuels from these processes lack good ignition characteristics and balanced distillation, thus adversely affecting the complete combustion of the fuel oil. Performance with such Diesel fuel oils often results in rough engine operation, excess carbon and gum formation, lower power output and high fuel bills. In the burning of substandard fuel oils, Conditioning is a "must."

Diesel plants using heavier grades of fuel oil, including Bunker C, may experience other problems, such as sluggish oil flow, clogging oil preheaters and excessive parts replacements. Experience in many plants definitely indicates that the Fuel Oil Conditioner eliminates sluggish oil flow by removing oil "tackiness." Clogging of oil preheaters is caused by precipitation and baking of solids in the oil onto the surfaces of the oil heaters, which can be eliminated by the use of the Oil Conditioner. Such a Conditioner is marketed under the trade name, "Kleen-Flo," by Combustion Service Co., 1451 Broadway, N. Y. C.

The Fuel Oil Conditioner is added through the fill line in the ratio of one gallon to every 2,000 gallons of oil just prior to its delivery. The first application should include additional conditioner to treat the oil present in the tank. No equipment is required.

The use of Fuel Oil Conditioning has resulted in the following advantages:

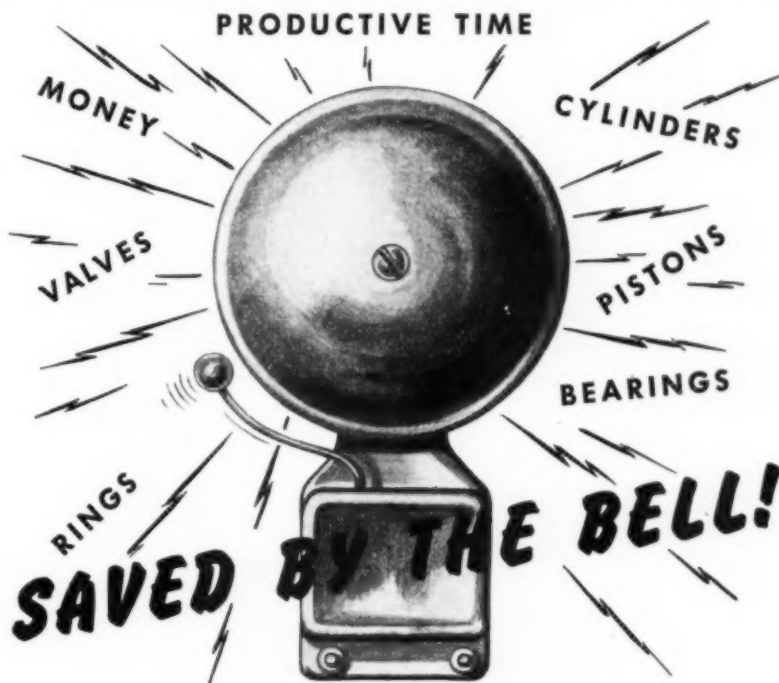
Counteracts oil contamination and eliminates the heavy ends; dehydrates fuel oil, keeps system free of water condensation and entrained moisture; increases the pumpability of heavy, viscous oils; keeps oil congeal-proof and free-flowing; eliminates clogging of oil lines and passages; keeps atomizing tips cleaner; improves atomization and starting from "cold"; effects complete combustion with less excess air and less turbulence; promotes smoke abatement; reduces stack losses due to unburned oil; eliminates dismantling and cleaning of pre-heaters; eliminates storage tank cleanings and pump-outs; aids the burning of sub-standard fuel oils; entails no interference with plant operation; requires no labor or equipment; gives quicker starting and smoother running; saves replacement parts; reduces vibration; greatly reduces carbon and gum deposits; takes load changes with ease; increases power and efficiency.

In the past, many oil treatments have been marketed as "sludge removers," which consisted

principally of petroleum derivatives such as kerosene. While "sludge removers" will sometimes prove temporarily effective, in most cases they are totally ineffective and may prove harmful. The amount of sludge that accumulates in tanks, heaters and lines of Diesel systems using the heavier grades of fuel oil is generally exaggerated. Likewise, with the use of light Diesel fuel oils, sludge accumulation is practically negligible. It is evident that the usefulness of a sludge remover is very limited. A Diesel Fuel Oil Conditioner should be scien-

tifically formulated and must contain no acids or harmful ingredients. It must not only eliminate sludge, but of far greater importance, it must vitalize the burning qualities of fuel oil and improve operation of entire Diesel system.

Fuel Oil Conditioning has been successfully used both in stationary and marine Diesel installations. An operator of a Diesel ferry boat complained of excess vibration and smoke, reduced engine speed and high fuel bills. Within 24 hours after the Oil Conditioning treatment



Conservation of critical materials, vital equipment and manpower is the keynote of American industry today. It is imperative that all machinery be operated and maintained efficiently and economically.

To accomplish this, time and material consuming shutdowns for the repair of all avoidable wear and damage must be eliminated. New parts are difficult to secure and are, in some cases, unobtainable. Skilled labor is also at a premium and manpower must not be wasted.

The installation of proper safety controls will help to reduce your Diesel equipment maintenance to a minimum, and allow the engine operator more time for other duties.

The Detroit Lubricator Company, with many years' experience in the design and manufacture of dependable controls, offers the Diesel manufacturer and user a complete line of "DL" Contact Makers designed to give constant, reliable protection for your Diesel equipment.

"DL" Contact Makers will automatically sound or flash an alarm in case lubricating oil pressure should fail, or bearing or cooling water temperature becomes excessively high. Where conditions make it desirable, they may also be wired to stop the engine.

For your country and yourself, protect that Diesel!

Bulletin No. 203, giving complete information on Diesel Engine Safety Controls, will be sent upon request.

DETROIT LUBRICATOR COMPANY

General Offices: DETROIT, MICHIGAN

Canadian Representatives—Railway and Engineering Specialties Limited, Montreal, Toronto, Winnipeg



was applied to the fuel oil in the storage tanks, operating conditions improved satisfactorily. A stationary Diesel plant using a heavier grade of fuel, similar to a #5 fuel oil, found the oil dirty and the flow sluggish. In time the condition became aggravated until the Oil Conditioner was introduced into the storage tank. As a result, the oil flows freely and uniformly and the engine performance is smoother and more efficient.

Conditioning conserves fuel oil and preserves

equipment in every type of Diesel plant, on land, sea and in the air. Savings in fuel oil alone more than pays for the cost of the Oil Conditioning treatment.

Cummins Appoints New Service Manager

RECOGNIZING THE importance of Service Department training and experience, the Government has again called upon the Cummins Engine Company for men with experience in this field. Dave Cravens, Cummins' Service

Manager, was the first to volunteer his services. Robert Bloomenstock, also of the service and parts department, was next, being appointed to special Diesel work in the Navy.

Now, Robert Stratton, former Cleveland Regional Manager who replaced Mr. Cravens as acting Factory Service Manager, has accepted a commission in the U. S. Signal Corps. Upon Mr. Stratton's departure to assume his new Army duties, P. E. Letsinger, vice president in charge of distribution, has announced the appointment of Deloss Cummins as Service Manager.



Deloss Cummins

Affiliated with the Cummins Company almost since its inception, Mr. Cummins started on the assembly line in 1915, worked his way up to factory superintendent in 1924 and filled this position until his transfer to the Service Department in 1929. Mr. Cummins has worked in the field with dealers, distributors, and owners and this fact, in conjunction with his background of factory experience, gives him a full understanding of service problems from every angle.

Mr. Cummins states that no radical changes in the present service policy are anticipated. "We realize that many Diesel mechanics have been called to the various branches of the service," says Mr. Cummins, "and by an increased number of Service Bulletins and other literature, are going to try to establish a program of information that will be helpful to mechanics that are new to the Diesel field. We also pledge our closest cooperation with the Government in their various training programs throughout the country."



GUESSING is costly — and dangerous

This is no time to play "shell" games with the Nation's gasoline and Diesel power—every unit must be kept operating at peak efficiency. Maintaining this efficiency and extending the service years of these engines is as important as any other phase of America's war effort.

That's where VISCO-METER* comes in... by offering the *one dependable means of making sure* of safe, efficient engine lubrication... vitally important because everyone knows the crankcase *lubricant* of any engine is its *life's blood*.

★ ★ ★

Lubricants are measured in terms of viscosity. Viscosity is at once the *most variable* and *most important* factor in lubrication

when the engine is in operation. Obviously it is necessary to *know* at all times, the viscosity (lubricating ability) of the oil as it circulates in use. Therefore the VISCO-METER* is a necessary part of your engines... the guardian of service-life and operating efficiency by making *visibly known at all times* the viscosity (lubrication ability) of the lubricant at crankcase temperatures.

★ ★ ★

The VISCO-METER* is service-proven, simple, accurate, inexpensive. If you design, manufacture or use internal combustion engines, then you should hear the whole story from a Visco-Meter engineer. No obligation. Write or wire:

VISCO-METER

CORPORATION

GROTE ST., BUFFALO, N. Y.

*Fully covered by U. S. and Foreign Patents

Long Island Sound Packets Converted

Continued from page 50 . . .

The bunker capacity of each ship varies somewhat. The *Calvert* fuel tanks hold 4700 gallons, those of the *Carisco* 7500 gallons, and *Pemaquid's* 6950 gallons. On the *Calvert*, there is a 3 hp. electric motor driven AECO hydraulic steering gear and on the *Carisco* a 7½ hp. electro-hydraulic gear built by the Mercer Engineering Works. Hand steering gear is used on the *Pemaquid*. A duplex Kahlenberg air horn with valve is mounted on the pilot house with pipe connection from the compressed air receivers in the engine room. A Youngstown Miller oil purifier completes the auxiliary equipment in the engine room of each ship.

The Bethlehem Steel Company designed and furnished the propeller for each ship. These are semi-steel wheels of variable pitch three bladed type, each designed to absorb the full power of the engine turning at 300 rpm. Naturally, due to the difference in hull characteristics of the three ships, diameters and pitch vary considerably as follows:

	<i>Calvert</i>	<i>Carisco</i>	<i>Pemaquid</i>
Diameter	78"	73"	80"
Pitch	49"	56"	56"

From this tabulation it is easy to see which of the three ships is the fastest. The *Calvert* attains a speed of 11 knots, the *Carisco* 10½ knots, and the *Pemaquid* is expected to reach a maximum of 13½ knots.

Compared with steam operation, these motorships will each save their owners on an average approximately \$1,500 a month. Dispensing with firemen entirely but retaining a two shift crew or two engineers and two oilers, a monthly saving of \$300 is accounted for. An additional \$1,200 is made possible by the fuel bills that have been reduced from \$1,700 to \$500 per month. Moreover, the conversion from steam to Diesel has made space available for an additional payload of fifty tons per ship or the equivalent in passenger accommodation.

West Coast Diesel News

PAUL C. WILSON, born in Fort Wayne, Indiana, and a graduate of Ohio State University, has been appointed manager of the newly created Publicity Department of the General Electric Company at San Francisco. Mr. Wilson was formerly associated with the appliance department.

FRED STOVNER, Diesel Engineering Company, Seattle, Washington, has been appointed

parts and service representative of the Enterprise Engine and Foundry Company for the Puget Sound area, with headquarters at 660 West Ewing St.

FIVE COOPER-BESSEMER Type GN-8, 11½ in. bore 13½ in. stroke, 420 hp. at 450 rpm. Diesels, direct connected to General Electric 30 kw. generators, using natural gas as fuel, have been installed by the Sulphur Springs Valley Electric Cooperative, Inc., at Wilcox, Arizona.

FOR THE San Francisco Bay 75-foot steel tug, *Crowley No. 21*, there is a new Atlas Imperial 300 hp. Diesel. The craft is owned by the Crowley Launch and Towboat Company and is in charge of Captain Bill Hopner.

THE 152-FT., 7,100-bbl., oil barge for Young Brothers, Honolulu, T. H., by the Bethlehem Steel Co., San Francisco, is all Fairbanks-Morse equipped—two 60 hp. Diesels for pumping; a 30 hp. and a 10 hp. Diesel for generator and compressor power. Pumps are also F-M.

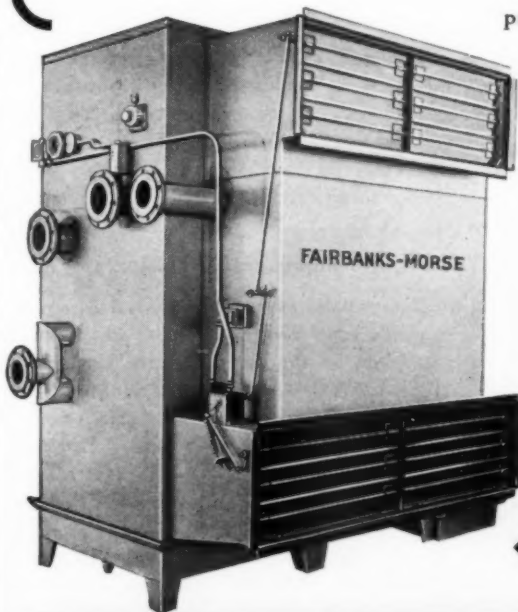
New Jacket Water Cooler HELPS DIESELS DO MORE TO WIN THE WAR!

NOW that we're at war, every kilowatt-hour is needed. We can't afford to let half-dead engines retard production . . . can't tolerate frequent shutdowns for engine servicing due to bad water or oil conditions.

Let the new Fairbanks-Morse Evapora-

tive Cooler help keep your Diesels at top efficiency by holding jacket water and lube oil always at the same, ideal temperatures. You'll save fuel and, by keeping jacket passages free from scale and dirt, will insure the lastingly efficient cooling which means less frequent necessity for servicing.

The F-M Evaporative Cooler needs practically no attention and requires little space . . . can be placed in the engine room to eliminate possibility of freeze-ups. Operating cost is low: water consumption is only about 2 lbs. per 1000 B.t.u. of engine heat absorbed. Initial cost and installation cost are low, too.



Write for This Bulletin

Bulletin FECD-2 tells the complete story . . . includes capacity tables, dimension drawings, piping diagrams, etc. Write for your free copy. Fairbanks, Morse & Co., Dept. 1 24,600 S. Michigan Ave., Chicago, Illinois.



F-M Evaporative Cooler

Type C, with full thermostatic control. Lube oil temperature is controlled independently of jacket water temperature. Other types provide for semiautomatic and for manual control.

FAIRBANKS-MORSE & CO.

Air Conditioning Division  Chicago

FAIRBANKS-MORSE 150 hp., Model 35, Diesel was chosen by W. F. Henningsen, Portland, Oregon, to repower his halibut boat *Metekla*, replacing the nineteen-year old Diesel of the same make.

ANOTHER SUPERIOR Diesel-propelled fish boat was launched by the Hodgson yard, Long Beach, California, May 28. She is the 92-ft. *Viking*; main engine 330 hp.; auxiliaries, two 100 hp., all fresh water cooled. Pumps and motors are Fairbanks-Morse.

TWIN WAUKESHA 6 cylinder Diesels with Twin Disc gears power the new all-welded steel shallow draft 63-foot Columbia River tug *Lew S. Russell Sr.*, recently commissioned by the Russell Towing Co., for service between Vancouver, Washington, and Bonneville Dam.

A NEW 65-FT. mail boat for Alaska Peninsula service is under construction in the Harold Hansen yard, Seattle, Washington. Power is a 4-cylinder Atlas Imperial Diesel and batteries are by Exide.

ATLAS IMPERIAL Diesels of 200 hp. have been selected by B. C. Packers, Vancouver, B. C., for powering three 78-ft. seine boats to be built under the Canadian Government's construction subsidizing plan.

WASHINGTON Diesels of 200 hp. have been ordered by the Canadian Fishing Co., for installation in new seine boats to be built in British Columbia yards.

BRITISH COLUMBIA sales of Mack marine Diesels include 100 hp. engines to Nelson Bros. Fisheries, and to Gulf of Georgia Towing Co., for repowering of existing craft operating in B. C. waters.

CATERPILLAR Diesels of 75 hp. with Twin Disc gears have been purchased by the Anglo-British Columbia Packing Co., Vancouver, B. C., for repowering of two seine boats.

THE UPPER COLUMBIA River Towing Company have converted the former 97-ft. Puget Sound freight vessel *Mohawk* into an ocean-going tug. She is completely Diesel—main engine a 1,325 hp. Enterprise; auxiliaries two Superior generator sets.

THE AUSTIN COMPANY having contracts on several Puget Sound construction jobs have chartered the O'Donnell tug *Olympic*. She has been repowered with a 165 hp. Gray Diesel with reduction gears.

THE 65-FOOT HARBOR excursion boat *Estrella* of the Star and Crescent fleet, San Diego, California, has been repowered with a 6 cylinder, 125 hp. Cummins Diesel. This is the nineteenth Cummins Diesel to be installed in this fleet.

AT VANCOUVER, B. C., the Harbor Towing Co., has installed a 100 hp. Caterpillar marine Diesel in its new 42-ft. towboat by A. C. Benson yard for service on Harrison Lake and River.

SMALL B. C. FISHING craft continue to be repowered with Diesel engines. The latest is the Nelson Brothers Fisheries *Elna M.*, Captain Mike Rasch, with a 125 hp. Cummins.

THE F. MILLERD Packing Company, Vancouver, B. C., is repowering its cannery tender *Mystery Bay* with a 100 hp. Mack marine Diesel with 3 to 1 reduction gears.

ANOTHER B. C. Diesel repowering job is that of the Powell River Co.'s tug *Powco* with

PROTECT ENGINE LIFE AND PERFORMANCE

Keep Your Oil Clean with "Proved-Performance" Filters

- Experienced Diesel engine operators know that clean oil means better engine performance, full power, less engine overhaul work, and lower oil costs.

MICHIANA Filters used with Diesel engines of all kinds and sizes have proven their high cleaning efficiency on trucks, tractors, vessels, railroad streamliners and switch engines, farm and construction equipment as well as in stationary engine plants.

Thousands of **MICHIANA** Filters are doing their part on Navy ships and other equipment used in our vital war effort,—meeting the high standards present conditions demand. Capacities up to 1633 H.P. in single units (Navy specifications) are now being made.

Interchangeable Elements

One or more Filter Elements are assembled in single containers or shells of various sizes depending on the filter capacity required,—all Elements being alike and interchangeable. These Elements are furnished in the Re-Packable Type or Replaceable Cartridge "Throw-away" Type. — Full data are included in our new Diesel Engine Filter Bulletin No. 42-D. A copy will be forwarded on request. **MICHIANA PRODUCTS CORPORATION**, Michigan City, Indiana.

MICHIANA OIL FILTERS

For Diesel Engines



Above:
Standard **MICHIANA** Lube Oil Filter equipped with four Elements which may be either the "Throw-away" type or the Re-Packable type.

At Right:
Showing group of four filter elements in model 19800 Filter. Standard filters are made with 1, 3, 4, 6, 7 and 10 interchangeable elements. **MICHIANA** Filters for Diesel engines (Navy specifications) are made in capacities up to 1633 H. P. in single units.



a D8800, 4 cylinder, 70 hp. at 900 rpm. Caterpillar with Burgess air intake snubber.

THE 46-FOOT Vancouver, B. C., towboat *Saltowco* of the Armour Salvage and Towing Company is now powered with new Gray marine Diesel of 110 hp.

AT ASTORIA, OREGON, the Columbia Boatbuilding Company, recently completed the 55-foot, 100 hp. Caterpillar Diesel-powered utility boat for Captain Paul Pirila; reverse and reduction gears are 2 to 1 Twin Disc.

Rogers Diesel and Aircraft Corp. Appoints Norman J. Hendershot



THE Rogers Diesel and Aircraft Corporation announces the appointment of Norman J. Hendershot as Advertising Manager. Mr. Hendershot, for seven years Assistant Advertising Manager for the Royal Typewriter Company, replaces Charles D. Cavett who has joined the copy staff of Pathe News, Inc.

New Automatic Synchronizers

A NEW AUTOMATIC synchronizer, type XK, to provide a practical and inexpensive device for automatically synchronizing small generators, is announced by the Westinghouse Electric and Manufacturing Company.

The type XK automatic synchronizer is limited in use to a.c. machines having a kva. rating of 250 or below and a voltage rating of 600 or less, with a suitable governor and fast closing machine contactor or breaker. One synchronizer and control switch is used for opening the machine contactor coil circuit when it is held closed magnetically. If the contactor is held closed by a latch and tripped electrically, the switch is used in the trip coil circuit. These

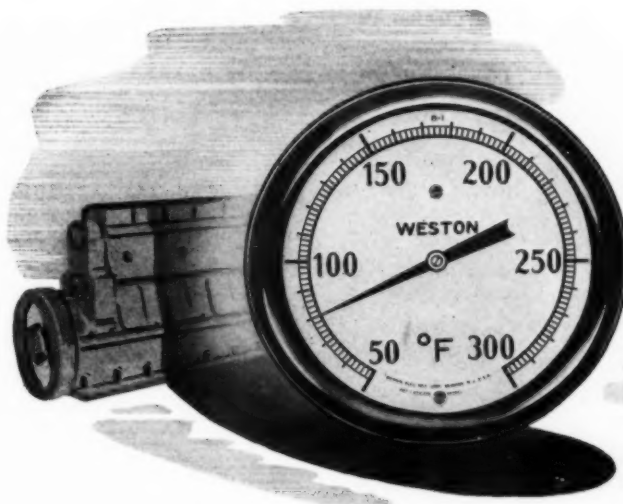
automatic synchronizers are available for 50-60 cycle service. Additional information may be secured from department 7-N-20, Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania.

New GE Bulletin On 65-Ton Diesel-Electric Switcher

GENERAL ELECTRIC Company announces publication of a new bulletin fully describing its 65-ton Diesel-Electric switching locomotive, a standard unit for quick delivery. This bulletin,

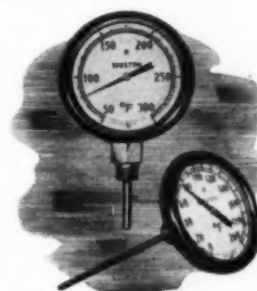
prepared with typical GE thoroughness, comprises sixteen, two-color pages of specifications, dimensional drawings, draw-bar speed charts and tables, and operating data. Some of the industries listed as users of the 65-ton Diesel-Electric switching locomotives are Cement, Chemical, Paper, Munitions, Steel, Machinery, Construction, Ordnance, Shipbuilding, Terminal-Railroad and others. Request your copy direct from General Electric Company, 1 River Road, Schenectady, New York, referring to Bulletin GEA-3598.

THE ALL-METAL THERMOMETER



stands shaking up...without breaking down

The reason why the WESTON Thermometer can "take it" is found in its simplified, all-metal construction. There is but one moving element, and even that part is made of enduring metal. There is no gas or liquids... no capillary... no fragile members. Thus the WESTON not only resists ordinary breakage but it also stands up in applications where vibration is present... maintaining its high initial accuracy (within 1% over entire scale) over far longer periods. Available in types, sizes, ranges and stem lengths for Diesel and many industrial applications. Descriptive literature available on request. Weston Electrical Instrument Corporation, 579 Frelinghuysen Avenue, Newark, New Jersey.



WESTON all-metal temperature gauges are available in both angle and straight stem types; scale diameters up to 6"; stem lengths from 2" to 24".

WESTON All-Metal TEMPERATURE GAUGES

American Bosch Appoints Loeffler Chief Engineer

OF SPECIAL interest to automotive engineers and those connected with the design and manufacture of internal combustion engines is the announcement that Bruno Loeffler has been appointed Chief Engineer of the American Bosch Corporation, Springfield, Mass.



Bruno Loeffler

Mr. Loeffler who is widely known in automotive engineering circles was formerly associated with Mack Trucks with which organization he

had been connected for twenty years, during the past fourteen of which he held the position of Chief, Design Engineer of the Engine Div.

Mr. Loeffler's broad experience with both gasoline and Diesel engines and their accessories is expected to be particularly valuable to the American Bosch organization which has always been closely connected with the engine industry.

Blackmer Pump Issues Bulletin On "Ezy-Kleen" Strainers

A COMPREHENSIVE bulletin covering their line of "Ezy-Kleen" strainers has just been issued by the Blackmer Pump Company.

The text of the bulletin stresses the importance of protecting pumps, through the use of strainers in the intake lines, and illustrates with cross-sectional views and describes the operation of four types of strainers manufactured by the Blackmer Company.

The features include heavier, more easily removable baskets, a completely steam-jacketed strainer for viscous liquids, a low-swing strainer with quick-detachable top, and a "T" type unit with provision for side outlet so that it may replace a standard elbow in suction line.

Specifications show that the four types of strainers are available in a choice of three standard constructions: all iron, bronze-fitted, and all bronze, and all strainers are rated in both gpm. and pipe size. It appears that the net straining area of each unit exceeds the recommendations of the Hydraulic Institute by a substantial margin.

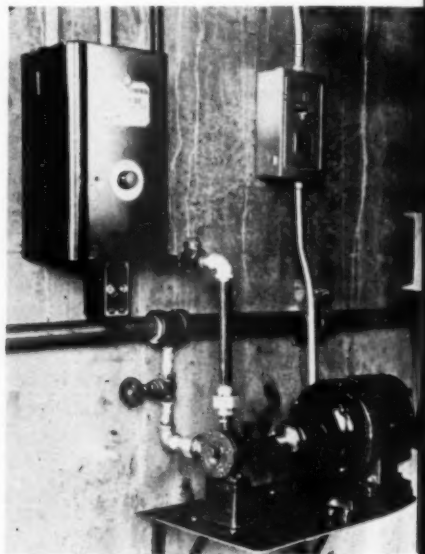
Copies of this bulletin will be sent upon request. Write Blackmer Pump Company, Grand Rapids, Michigan, specifying Bulletin No. 400.

Supervising and Operating Engineers' Section

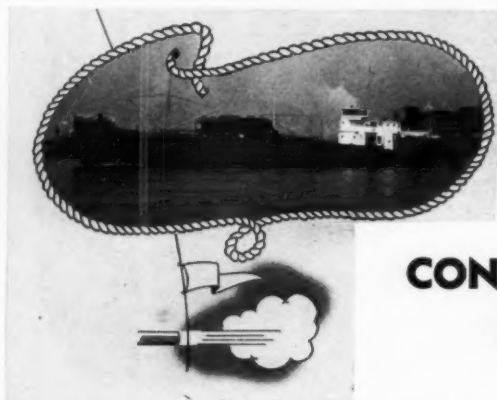
Continued from page 57

cerning his problems, for he doesn't have the time to make his old periodical call to ascertain how things are going.

Then, too, each engineer should study the equipment which is under his care. Often he can find out and suggest changes and additions which make for better operation. As an instance of this, the accompanying cut shows a



auxiliary pump which was installed to eliminate trouble in starting after a period of several hours of shutdown. This was on an air injection type engine and after hours of being out of service, especially in cold weather with the unit chilled, the fuel pump did not immediately furnish the proper amount of fuel at proper pressure to start the unit. This equipment was on hand at the plant, and not in service, so one week end the boys assembled it, made a coupling, and mounted it in such a manner that they had a positive head on it from the service tank and cut it in on the main fuel line. The push-button switch was mounted



LAST NOVEMBER WE SALUTED THE TANKER "T. W. DRENNEN." NOW IT IS THE TANKER "A. C. DODGE."

CONGRATULATIONS, MR. DODGE

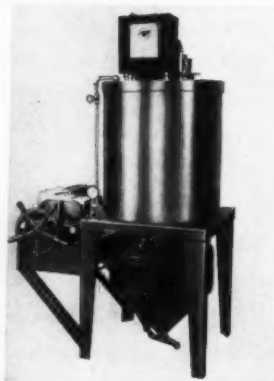
We Are Honored That Our Model A-17 Lube Oil Purifier Was Selected To Serve The F-M Engines On Both Tankers.

THERE MUST BE A REASON!



Lubricating Oil Purifiers for Marine and Stationary Diesel installations of all sizes

YOUNGSTOWN MILLER Co., Inc. • SANDUSKY, OHIO



near the starting lever, and before starting, they opened the valves and started this auxiliary fuel pump. They had plenty of fuel and pressure behind it and the unit started immediately and, as soon as it was rolling, the auxiliary pump was cut out and the main fuel pump took up the burden. This is just one small instance of improving operation by use of material available.

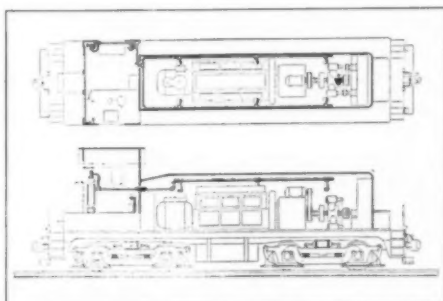
Donaldson Company, Inc., Announces Changes in Official Staff

DONALDSON COMPANY, INC., manufacturer of heavy-duty Air Cleaners for tractors, trucks and power units, announces the following changes in official staff:—John C. Enblom of the Engineering Department has been made First Vice President and Acting General Manager, a responsibility well fitting his experience and capacity. R. H. Donaldson has resigned from active participation in the business and has become Chairman of the Board of Directors. Other officers remain as in the past.

Carbon Dioxide Gas Protects Diesel Locomotives from Fire

A SIMPLE YET dependable system for protection of Diesel engines against fire, consists of a charged steel cylinder, means of manual

operation, and a system of delivery piping and discharge nozzles around the Diesel compartment. It is known as the Alfite system. The gas is stored in liquefied form in the cylinder under a pressure of 800 to 1000 lbs. per square inch. It is heavier than air, non-corrosive, harmless. Upon operation, the liquefied carbon dioxide is expelled by internal pressure, passing rapidly through piping and nozzles, where it changes instantly to inert gas, expanding to about 450 times its original volume, and penetrating to every nook and cranny throughout the Diesel compartment. Fire is swiftly snuffed out through the dilution of the oxygen content of the air below the point of combustion.



Typical Alfite installation. Delivery piping, usually 1/2", exaggerated for clearance.

Alfite gas will not freeze at any climatic temperature. It does not deteriorate. Periodic

weighing checks contents. A non-conductor, it may be used with safety on live electrical equipment.

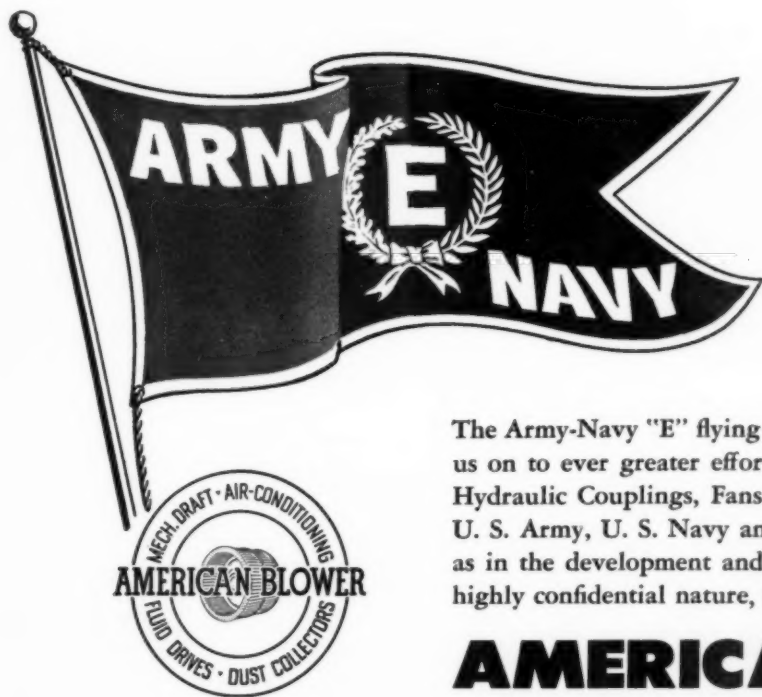
Where a permanently installed piping system is not desired, an Alfite portable extinguishing unit has been developed. It consists of a 50 lb. cylinder, a 50 ft. length of flexible rubber hose, carried on upper and lower hose racks, and a discharge horn provided with a quick-acting temporary shut-off valve. The unit is attached to a wall of the cab by means of specially designed brackets. The wall brackets are of the quick-detachable type, allowing instant removal for extinguishment of fires outside of, or beneath the locomotive.

The unit has been designed to occupy a minimum of room in the confined space of a locomotive cab. It is 58" high by 18" wide, and projects from the wall only 12".

The manufacturer is American-LaFrance-Foamite Corporation, Elmira, N. Y.

Cummins Regional Office Enlarged

TO BETTER SERVE the increasing number of Cummins Diesel users in the oil fields, and because of the growing number of manufac-



The Army-Navy "E" flying over the American Blower plants spurs us on to ever greater efforts in the production of (Fluid Drives) Hydraulic Couplings, Fans and Air Handling Equipment for the U. S. Army, U. S. Navy and U. S. Maritime Commission, as well as in the development and production of special equipment of a highly confidential nature, for the Armed Forces.

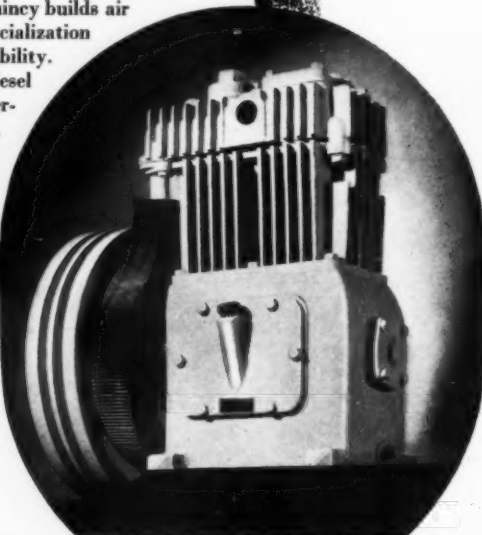
AMERICAN BLOWER
HYDRAULIC COUPLING DIVISION
DETROIT, MICHIGAN

1st IN DESIGN TOPS IN EFFICIENCY

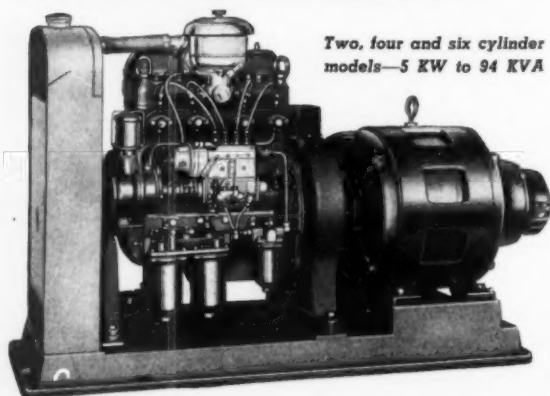
☆ Quincy was the first to design an air compressor that combined modern appearance with improved mechanical features. Construction is simpler. Radiation area is increased 12%. Lubrication is more thorough—more positive. Quincy builds air compressors *exclusively*. This policy of specialization has made Quincy a symbol for dependability. Quincy Compressors provide air for Diesel starting and other services requiring intermittent pressures up to 500 lbs. per sq. inch. *If you have compressed air problems in your work, let us help you solve them!*

Quincy
COMPRESSORS

QUINCY COMPRESSOR CO., DEPT. 492, QUINCY, ILLINOIS



ON EVERY BATTLE FRONT!



Two, four and six cylinder models—5 KW to 94 KVA

ELECTRICITY is playing a major role on every battle front — land, sea and in the air. That is why every Electric Plant our all-out effort can build goes directly into military service.

UNITED STATES
MOTORS CORP.

Oshkosh, Wis.

U.S. DIESEL
ELECTRIC PLANTS

turers using Cummins Diesels to power their equipment, the Cummins Engine Company has enlarged their regional offices at Fort Worth.

Formerly located in the Mid-Continent Building, the company has taken larger quarters at 1812 Fair Building, where J. B. Chambers, Regional Manager, will be in a position to facilitate the handling of all sales and service matters through the distributors, the Mid-Continent Supply Company and the Cummins Diesel Sales and Service Company, Inc.



J. B. Chambers

Mr. Chambers is well known in the Mid-Continent territory, having been appointed Regional Manager at Fort Worth in 1935. Affiliated with the Cummins Company since 1925, Mr. Chambers received his Diesel training in various capacities at the Cummins factory. Starting as apprentice machinist, he operated drill press, lathe, milling machine, screw machine, and key cutter. Transferred to Service Maintenance in 1928, he acted as test block foreman, and was later sent to the East Coast, where he supervised the installation of Diesel machine engines and auxiliary generating sets in various types of boats. He returned to the factory in 1930 as Experimental Engineer—running laboratory tests, and building experimental trucks, buses and race cars. In 1935, Mr. Chambers was chosen as Cummins representative in the important petroleum territory, where he is responsible for all Cummins activities.

It is felt that the enlarging of the Regional Office at Fort Worth will prove a big help in maintaining a closer relationship between the factory and the owner—both the individual owner and the equipment manufacturer—because it will enable the organization under Mr. Chambers to keep in better touch with the buyers' needs and thus facilitate the adjustment of all matters pertaining to distribution.

Prec

Fuel

Demco des based on t effective D injection u pactness an quality mat

DI
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NO

★ Nozzles three sizes standard No. 4 nozzle

DI
F
INJ

★★ Fuel hydraulic closed type lengths w diameters.

★★

DEM
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★★★ "PH port contr able to a minor adj

Send

DIESE
& MAN

200-214 N.

Precision Built...

DEMCO Fuel Injection Equipment

Demco design, manufacture and test are based on the ultra-precise requirements of effective Diesel fuel injection. Demco fuel injection units are characterized by compactness and clean, simple design, highest quality materials, and superb workmanship.

★

DEMCO FUEL NOZZLE



★ Nozzles are made in three sizes, with flat seated needles of standard or non corrosive materials. No. 4 nozzle is self-cooling.

★★

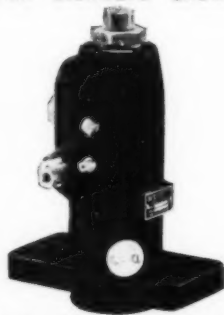
DEMCO FUEL INJECTOR



★★ Fuel injectors are hydraulically operated, differential, closed type and are made in various lengths with three standard shank diameters.

★★★

DEMCO FUEL INJECTION PUMPS



★★★ "PH" fuel injection pumps are port controlled type; they are adaptable to a wide range of Diesels with minor adjustment of timing.

Send specifications with inquiries

DIESEL ENGINEERING & MANUFACTURING COMPANY

200-214 N. LAFLIN ST. CHICAGO, ILLINOIS

First War Bond "Bull's-Eye" Flag To Be Presented by U. S. Treasury Awarded To Ex-Cell-O Corporation

THE Ex-Cello-O Corporation, Detroit, Michigan, was awarded the U. S. Treasury "Bull's-Eye" flag for being the first firm to exceed, in the War Savings payroll deduction campaign, 90% of its employees and 10% of its payroll. The flag was presented by the U. S. Treasury through Frank N. Isbey, State Chairman of Michigan War Savings Committee, and Lieut. Jack A. Sims of Kalamazoo, Michigan, one of General Doolittle's Navigators who bombed Tokyo.



Governor Van Wagoner of Michigan pays tribute to the workers of Ex-Cell-O Corporation for winning the nation's first U. S. "Bull's-Eye" Flag (shown top left) under the U. S. Treasury's War Bond Payroll Deduction Plan, and for its record in the production of aircraft parts.

Present at the ceremonies were Hon. Murray D. Van Wagoner, Governor of Michigan; Edward J. Jeffries, Mayor of Detroit; Representatives of the Army and Navy; Detroit Board of Commerce; and Mayors of surrounding cities. Ex-Cell-O Corporation manufactures precision machine tools, aircraft parts, and Diesel fuel injection equipment.

Norma-Hoffmann Board Elects Clarence E. Stevens

NORMA-HOFFMANN Bearings Corporation, Stamford, Connecticut, announces that, at a meeting of its Board of Directors, Clarence E. Stevens was elected Vice-President in charge of Plant Operations, and assumed his duties on August 15, 1942.

Mr. Stevens was, until April 1, 1942, Vice-President in charge of Manufacturing of Electrolux, Incorporated, (manufacturers of vacuum cleaners) at Old Greenwich, Connecticut. He succeeds Mr. Charles B. Malone who resigned on July 31 to become associated with another industrial business in Stamford.

On Diesels, STATIONARY or MOBILE..

AVOID SHUTDOWNS with DELUXE CLEANSSED OIL!

It's oil contamination that so often causes poor engine performance, shortens bearing and piston life and threatens costly shutdown. What oil filter will best stop this contamination? The answer is DeLuxe! The one filter that cleanses oil of contaminating asphaltene before they can join with other substances to form highly destructive sludge and engine varnish. You can use any fortified oil, without risk of altering its chemical balance, because DeLuxe's famous cleansing action does not depend on a chemical agent.

DELUXE 8-POINT CONSTRUCTION ESSENTIAL TO OIL CLEANSING!



Only DeLuxe has all eight of the construction features which make it possible to continually and thoroughly cleanse oil instead of simply straining or filtering it. It is growing recognition of this fact that is causing the widespread, increasing preference for DeLuxe Filters on diesel engines of every type. Write for DeLuxe folder showing valuable engineering data on oil, as well as full facts about DeLuxe filter construction. DeLuxe Products Corp., 1406 Lake St., LaPorte, Ind. In Canada: 364 Richmond St., W., Toronto, Ontario.

DELUXE OIL FILTER

DOES MORE THAN STRAIN OIL
... MORE THAN FILTER OIL

Actually Cleanses Oil!

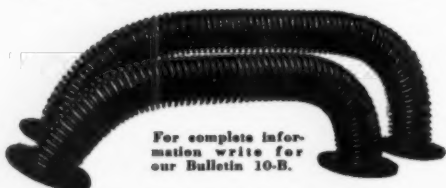
Atlantic Seamless Flexible Metal Hose

is highly recommended by leading Diesel Engine Manufacturers, Naval Architects and Engineers for

Diesel Exhaust and Air Intake

Absorbs vibration. Can't leak or burn out. No joints to loosen. No packing to rely on for tightness. In sizes 1" to 36" I.D., inclusive. With forged steel flanges or nipples in lengths desired, straight or bent to your specifications. Atlantic Hose is widely used in Industrial Plants, on Railroads, in Marine service and by the United States Navy.

ATLANTIC METAL HOSE CO., Inc.
102 W 64th STREET NEW YORK



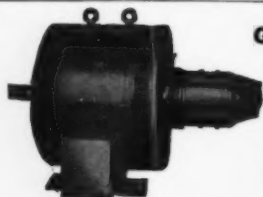
For complete information write for our Bulletin 10-B.

Pierce Governors

Standard Equipment on the world's leading Diesel Engines!

THE PIERCE GOVERNOR COMPANY
1603 OHIO AVE., ANDERSON, INDIANA

Ice Cream Cabinets \$10 up — Compressors \$5 up — 1/4 hp. motors — 2 hp. Hobart Mixer — 2-12"x20" shell-tube condensers — 30 hp. slipring — 8x8 & 9x9 ammonia compressors — 2 Krupp diesels 90 hp., 3 Cylinders. Kelvinator 1 & 2 hole ice cream cabinets. 4x4 York self-contained ammonia plant. Black & White Corporation, 574 West 130th Street, N. Y.



GENERATORS

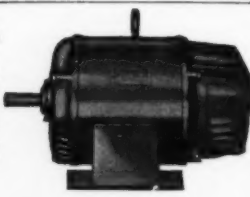
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3 to 150 kw.

For Diesel and gasoline engine drive

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For all applications Stationary and Marine



STAR generators and motors are extensively used in both stationary and marine service. STAR gear motors are made in both planetary and worm gear types with and without integral brakes.

STAR ELECTRIC MOTOR CO. BLOOMFIELD, NEW JERSEY

John L. Bossert

JOHN L. Bossert, Sales Engineer for the Ward Leonard Electric Co., Mount Vernon, New York for the past seventeen years, died at his home in that city, Thursday, July 9.

Mr. Bossert, after a period of teaching at Cooper Union, New York, where he obtained his degree in electrical engineering, joined the sales force of Ward Leonard. He had been in charge of sales engineering work on naval and marine equipment of the company.

Lead Alloys to Replace Tin for Engine Bearings

AMERICAN ingenuity is finding a way to meet the tin shortage as it threatens one of the most important applications of this highly strategic metal. Engineers believe they have now found ways to produce alloys of lead to take the place of tin alloys in bearings. One of the most gruelling trials of new lead alloys for bearings is being conducted at The Cooper-Bessemer Corporation, Mount Vernon, Ohio, according to Ralph Boyer, chief engineer.

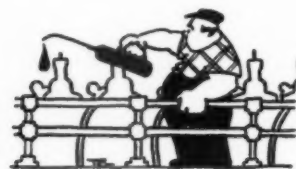
"Alloys with lead as the base metal have been put into bearings of the corporation's Diesel engines and air compressors, and from all indications they are doing very well," says Mr. Boyer. "About a year of testing will be required, however, to prove conclusively that lead is an adequate substitute. We have run our tests for the last several weeks.

"We have been forced to turn to lead as a base metal in the place of tin, and now there is every indication that lead will produce better bearings than we have ever had before." The importance of tin as a strategic metal is brought out by the fact that bearings in every automobile being driven in the United

States contain on an average about 7 1/2 pounds of this metal. The bearings contain between 88 and 90 per cent tin.

"Now that the source of tin in the Far East has been cut off, the United States will have an increasingly difficult time finding substitute sources of this metal. Tin now is being carefully allotted by the War Production Board.

"This has caused industry to turn very rapidly to bearings with lead as the base metal. The composition of the lead base alloys is being kept a carefully guarded secret. It varies somewhat with different industries. They must duplicate, as nearly as possible, the desirable qualities of tin as a base metal.



DIESEL ENG. GEN. SET FOR SALE

6 cyl. 14 x 17 F.M. 257 RPM. VA. Solid Injection d/c to 300 KVA, 3/60/2300 gen. with d/c exciter complete with auxiliaries—excellent condition—can be seen in operation—Price \$12,000.

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Because of These Features

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5 to 700 GPM—up to 300 psi.

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SPECIAL PURPOSE PUMPS

For applications not covered by our standard pumps, Blackmer engineers will undertake the design of special units.

Write Blackmer Pump Company, 1969 Century Avenue, S.W., Grand Rapids, Michigan for Bulletins: 301—"Facts about Rotary Pumps"; and 302—"Pump Engineering Data."

They are FREE to pump users.



BLACKMER Rotary PUMPS
BUCKET DESIGN—SELF-ADJUSTING FOR WEAR

"The most critical test that could be put to a new bearing alloy is its use in an internal combustion engine such as a heavy duty Diesel. It must stand up under high temperatures and pressures."

Commenting on the government's recent conservation order requiring dealers who sell material in tube containers to receive an empty one instead, Boyer observed, "The unfortunate thing about this order as it applies to the tin user is that metallic tube containers are made largely of aluminum."

FOR VICTORY



BUY
UNITED
STATES
WAR
BONDS
AND
STAMPS

Fairbanks-Morse Personnel Changes

ROBERT H. MORSE, JR., who has been branch manager successively of Fairbanks, Morse & Company's offices at Cincinnati, Dallas, and Boston, has recently taken his position as assistant to Mr. A. C. Dodge, vice-president and sales manager, Fairbanks, Morse & Company, Chicago, Illinois.



R. H. Morse, Jr.

Mr. John Elmburg, formerly manager of the Diesel Engine Department at St. Paul, Minnesota, has been made manager of the Boston branch to fill the vacancy left by Mr. Morse.

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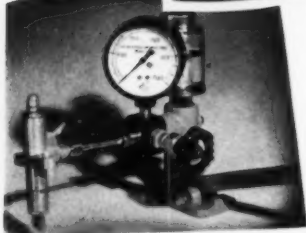
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Manufacturers of Diesel Pumps, Injectors, Nozzles, Nozzle Holders, etc.

New Ex-Cell-O Bulletin

IN A NEW twenty-page catalog, just published, Ex-Cell-O Corporation, of Detroit, illustrates and gives complete specifications on its entire line of precision machine tools, cutting



tools, and related products. A copy of this catalog—No. 27121—is available to all interested. Write for it!

Robinson Appointed To Executive Post at American Bosch

THE AMERICAN Bosch Corporation, Springfield, Mass., has announced the appointment of W. Chester Robinson as Executive Assistant to Vice-President Edward H. Moll who has charge of American Bosch manufacturing operations.



W. Chester Robinson

Mr. Robinson, who has had unusually broad manufacturing experience comes to American Bosch from the General Electric Company with which he has been associated for twelve years. Originally connected with General Electric's Schenectady plant, he has for the past seven years been located at the Bridgeport Division.

Hemphill Announces Research Foundation

BEFORE a group of over five hundred Southern California business, civic and military officials, the formation of the Ralph Hemphill Research Foundation was announced, during the recent opening of the enlarged Hemphill Institute of Technology. Its founder, Ralph Hemphill, explained that the primary objective of the Foundation was to foster the development of products and methods that are of military value in pursuit of America's victory program.

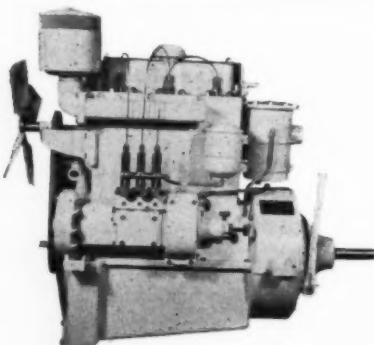
Commenting on the Ralph Hemphill Research Foundation, Hemphill said "There are scores of machines and processes which our country seriously needs that have been invented, and frequently the problem facing the inventors is the perfection of their ideas by engineers and production men. On the staff of the Foundation is a group of men well known in aviation, plastics and Diesel engineering fields who are responsible for many widely used processes or products that are aiding our Victory program. This staff, together with lab-

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The SHEPPARD, full Diesel engine of all American design and manufacture is complete with all necessary operating accessories and generator to match or power take-off—"ready to run." Bolt this power package down—fill the fuel tank and put it to work.

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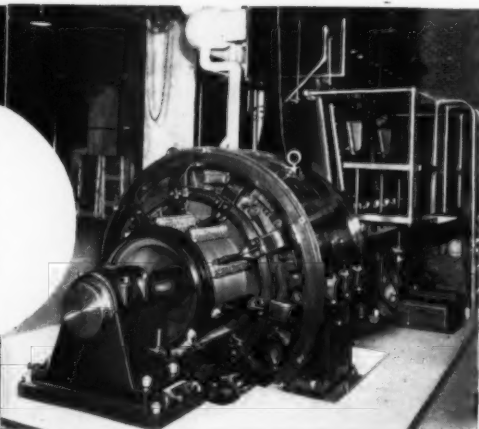


Model 6, three cylinder, 25 h.p. SHEPPARD Diesel engine

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oratory facilities and shop equipment, are now
made available to men with ideas and inven-
tions, entirely without cost and to aid our
country in successful termination of this war."



Ralph Hemphill

Members of the Technical Board of the
Foundation are Thomas M. Shelton, Chief of
Training at the Aero Industries Technical In-
stitute, John F. Delmonte, Research Director
of the Plastics Institute, Ray E. White, Chief
Engineer of the Hemphill Institute of Tech-
nology, and Lieut. W. H. Coffin, Operations
Manager and Flight Engineer of the United
Flying Schools of America.

Announcement of the Ralph Hemphill Re-
search Foundation was made during the dedi-
catory ceremonies of the expanded Diesel en-
gineering training school operated by Hemp-
hill, who recently acquired the former Har-
vard Military School in which to carry out a
large training program for Navy personnel in
the operation, maintenance and overhaul of
Diesel engines. The facilities embrace two
city blocks of campus, class-rooms, shops, and
dormitories. Other Hemphill operated
Diesel engineering schools in New York, Mem-
phis and Chicago are training additional num-
bers of Army and Coast Guard personnel in
similar subjects. Hemphill is also prominently
identified in the training of aircraft mechanics
and pilots for the Government, in addition
to training plastics engineers in another in-
stitution operated under his direction.

Among those attending the colorful dedica-
tory ceremonies were Maj. Chas. Oliver of the
U. S. Army Air Forces, Kinner Hamilton, for
the past many years President of the Harvard
Military School, Lieut. George H. Kellogg of
the U. S. Navy, Dr. Paul Ivey of the Uni-
versity of Southern California.



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**GIVES MORE POWER
SMOOTHER OPERATION
PEAK EFFICIENCY**

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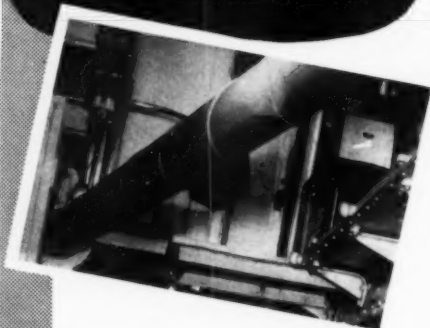
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After victory, even better WITTE Dieselectric
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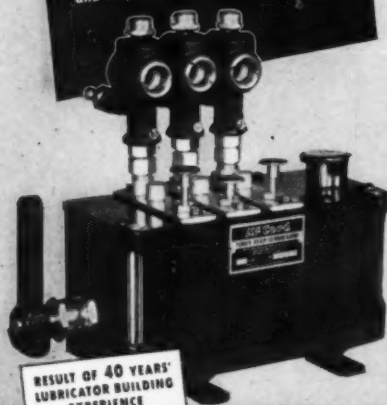
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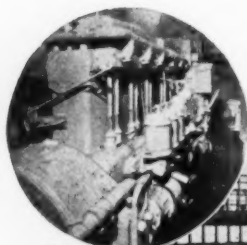


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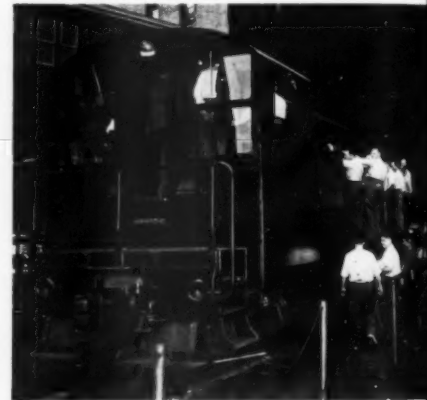
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Saving installation time is most important in plants producing for Victory — one customer writes: "So far the new ROPER has proved the easiest of all to install. In fact the last 6 ROPERS installed saved 18 hours labor—about 3 hours on each."

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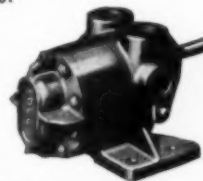
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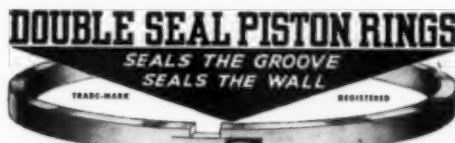
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with valuable pumping
information.

Ask for Catalog 935

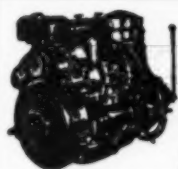


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FORCE FEED
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Deliver oil to cylinders and bearings automatically, exactly in proportion to engine's needs. Large, tubular, liquid-filled sight glasses show amount of oil delivered on each pump stroke. Feed is easily adjusted and very accurate. Special fitting under each glass permits refilling sight glasses without removing pumping unit or disconnecting oil lines.

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DIESEL ENGINE DIVISION
AUBURN • NEW YORK

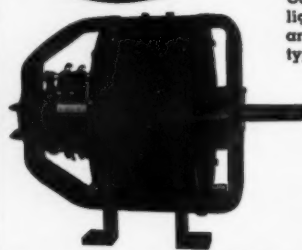

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A. C. AND D. C. GENERATORS

Columbia A.C. and D.C. Generators are designed and widely used for light and power service and are ideal for use as ship auxiliaries. They are light in weight, compact and can be furnished in single bearing type for direct connection to engines.

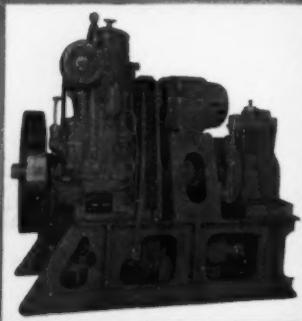
A.C. Generator sizes range from 6 1/4 to 300 KVA. Speeds: 1800, 1200, 900, 720, 600, 514 and 450 R.P.M. Single or three phase; direct connected or belted exciters.

Columbia D.C. Generators range in size from 7 1/2 to 200 KW, 36, 60, 125 and 250 volts and in speeds of 1750, 1450, 1150 and 850 R.P.M.

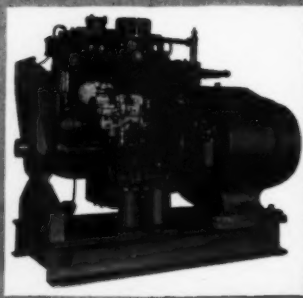



COLUMBIA ELECTRIC MFG. COMPANY
4519 HAMILTON AVENUE CLEVELAND, OHIO

REINER DIESEL Marine Auxiliary Units



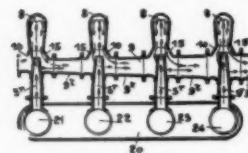
- Marine auxiliary units 5 to 60 hp., 1 to 6 cylinder.
- With any generator—pump—compressor combination required.
- Generator sets 3 to 75 kw.
- Special auxiliary units designed to individual requirements.



JOHN REINER & CO., INC., Long Island City, N. Y.

2,240,052
DEVICE FOR DESTROYING SOUND WAVES, MORE ESPECIALLY UTILE AS A SILENCER FOR COMBUSTION AND EXPLOSION ENGINES.

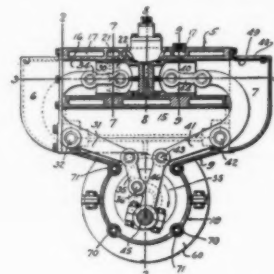
Robert Pierre Pomis, Paris, France
Application June 28, 1938, Serial No. 216,181
In France June 30, 1937
9 Claims. (Cl. 181-53)



1. In a silencer for an internal combustion engine or the like, a casing forming a gas expansion chamber having opposite end walls, an inlet port located in one end wall and an outlet port located in the other end wall, said inlet and outlet ports determining a longitudinal axis in said silencer, a concave bottom forming a downward extension below said axis in said casing, an upward extension above said axis forming a concave top in said casing opposite said concave bottom, separation means separating one port and the concave top, on the one hand, from the other port and concave bottom, on the other hand, and means including a pipe extending transversely of said axis and connecting the interior of the casing within said concave top with the interior of said casing within said concave bottom through said separation means, there being means for connecting the inlet port with an exhaust pipe of said engine.

2,237,113
TWO-CYCLE OPPOSED-PISTON DIESEL ENGINE

Frederic W. Plumb, West Reading, Pa.
Application March 13, 1939, Serial No. 261,441
8 Claims. (Cl. 123-51)



1. A two-cycle opposed piston engine of the compression-ignition internal-combustion type comprising a plurality of similar interchangeable combined cylinder-and-crank case complete engine units adapted for connected side-by-side assembly, a drive shaft having a plurality of crank pins, one for each assembled engine unit, end housing units on said shaft connected to the respective end engine units, and means for fixedly uniting said units so as to form lubricant passage-ways to the interiors of the latter.

2,241,492
COMPRESSION-IGNITION ENGINE FUEL

Byron M. Vanderbilt, Roselle Park, N. J., assignor to Standard Oil Development Company, a corporation of Delaware.
No Drawing. Application April 4, 1939, Serial No. 265,938
6 Claims. (Cl. 44-9)

1. An improved Diesel fuel comprising hydrocarbon fuel and dissolved therein a minor proportion of a nitroalkyl mononitrate in a sufficient quantity to impart improved igniting qualities to the fuel.